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Notes on Some Opisthobranchia (Mollusca: Gastropoda) from the Marshall Islands, Including 57 New Records[1]

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ABSTRACT: The rich opisthobranch fauna of the Marshall Islands has remained largely unstudied because of the geographic remoteness of these Pacific islands. We report on a long-term collection of Opisthobranchia assembled from the atolls of Bikini, Enewetak, Kwajalein, Rongelap, and Ujelang. Fifty-seven new records for the Marshall Islands are recorded, raising to 103 the number of species reported from these islands. Aspects of the morphology, ecology, development, and systematics of 76 of these species are discussed.

THE OPISTHOBRANCH FAUNA OF THE Marshall Islands, a group of 29 atolls and five single islands situated 3500 to 4400 km west southwest of Honolulu, Hawaii, is rich and varied but has not been reported on in any detail. Previous records of Marshall Islands' Opisthobranchia record only 36 species and are largely restricted to three studies. Opisthobranchs collected in the northern Marshalls during the period of nuclear testing (1946 to 1958) and now in the U.S. National Museum, along with additional material from Micronesia, were studied by Marcus (1965). Marcus and Burch (1965) and Young (1967) reported additional species from Enewetak Atoll based on short-term collections at the Enewetak Marine Biological Laboratory (presently the Mid Pacific Research Laboratory).

This study is the result of a long-term collection assembled in the Marshall Islands over a period of 3 years. Collections were made virtually daily at sites throughout Enewetak Atoll (11°33′N, 162°20′E) for a period of more than a year. Shorter term collections were made at Rongelap (11°19′N, 166°49′E), Bikini (11°35′N, 165°20′E), Kwajalein (8°58′N, 167°42′E) and Ujelang (9°51′N, 160°58′E). Additional records were obtained from collections and from photographs taken by several residents of Kwajalein.

In this paper 76 readily identifiable, previously named species are discussed, 57 of which are new records for the Marshall Islands (Table 1).

METHODS

The present collections were made on intertidal reefs and in shallow water by snorkeling and by scuba diving to depths of 25 m, both by day and night.

Descriptions, measurements, and color photographs of living specimens were recorded. When possible, prey items were collected and identified. Ova were obtained by holding specimens in individual containers placed in an aquarium provided with flow-through seawater at ambient temperatures (27.5° to 29°C). We have followed convention in using Thompson's (1961) larval shell classification. Developmental features of the chromodorid species recorded here are found in Boucher (in press).

Initial identifications based on external morphological characteristics were verified by dissections of the radulae and reproductive systems when appropriate. Descriptions of coloration, external morphology, and internal anatomy are provided only for those species not adequately described in previous studies, or in those cases in which our material varied significantly from other descriptions.

Locality data are cited such that the atolls are simply named followed by specific localities within the atoll, for example, Jedrol Island, Medren Pier, Enewetak.

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TABLE 1

SUMMARY OF OPISTHOBRANCH SPECIES REPORTED FROM THE MARSHALL ISLANDS

OPISTHOBRANCH SPECIES	ATOLL	SOURCE
Order Soleolifera		
Onchidiella evelinae Marcus and Burch, 1965	E	Marcus and Burch 1965
Peronia peronii (Cuvier, 1804)	A, B, E	Marcus 1965
Order Cephalaspidea		
Acteon variegatus (Bruguière, 1789)	E	Ekdale et al. 1979
Pupa sulcata (Gmelin, 1791)	E	Ekdale et al. 1979
Retusa sp.	B	Marcus 1965
Phanerophthalmus smaragdinus (Rüppell and Leuckart, 1828)	E	Marcus and Burch 1965
Smaragdinella calyculata (Broderip and Sowerby, 1829)	E	Marcus and Burch 1965
Hydatina amplustre (Linnaeus, 1758)	E, K	Brost and Coale 1971 (K)
Hydatina physis (Linnaeus, 1758)	K	Brost and Coale 1971
	E	
**Micromelo guamensis* (Quoy and Gaimard, 1825)	E, K	
Atys cylindricus (Hebling, 1779)	E	Ekdale et al. 1979
Haminoea cymbalum (Quoy and Gaimard, 1835)	E	Marcus and Burch 1965
Haminoea galba Pease, 1861	E	Ekdale et al. 1979
Haminoea linda Marcus and Burch, 1965	E	Marcus and Burch 1965
Haminoea musetta Marcus and Burch, 1965	E	Marcus and Burch 1965
**Bulla vernicosa* Gould, 1859	E	
Chelidonura hirudinina (Quoy and Gaimard, 1833)	B	Marcus 1965
	K	
**Chelidonura inornata* Baba, 1949	E, K	
Philinopsis gardineri (Eliot, 1903)	E	Switzer 1971 (?)
	K	
**Sagaminopteron psychedelicum* Carlson and Hoff, 1974	K	
Order Anaspidea		
**Aplysia parvula* Guilding in Mörch, 1863	E, K	
Aplysia pulmonica Gould, 1852	E	Marcus 1965
**Dolabella auricularia* (Lightfoot, 1786)	E, K	
Dolabrifera dolabrifera (Cuvier, 1817)	B	Marcus 1965
	E	Marcus and Burch 1965
	K	
Stylocheilus longicaudus (Quoy and Gaimard, 1825)	B	Marcus 1965
	E	Marcus and Burch 1965
	K	
Order Sacoglossa		
**Stiliger smaragdinus* Baba, 1949	E	
**Plakobranchus ocellatus* van Hasselt, 1824	B, E, K, U	
Elysia bayeri Marcus, 1965	B	Marcus 1965
	E, K	
**Elysia halimedae* MacNae, 1954	E	
**Elysia livida* Baba, 1955	E	
Elysia marginata (Pease, 1871)	B	Marcus 1965
	E, R	
**Elysia obtusa* Baba, 1938	B, E	
**Elysia ratna* Marcus, 1965	E, K	
**Elysia vatae* Risbec, 1928	E, K	
* *Oxynoe viridis* (Pease, 1861)	R	

OPISTHOBRANCH SPECIES	ATOLL	SOURCE
Order Notaspidea		
**Berthellina citrina* (Rüppell and Leuckart, 1828)	E, K	
Order Nudibranchia		
Hexabranchus sanguineus (Rüppell and Leuckart, 1828)	E	Marcus 1965
	K	
Doriopsis pecten (Collingwood, 1881)	E	Young 1967
	B, K, U	
Doriopsis viridis Pease, 1861	E	Young 1967
**Platydoris cruenta* (Quoy and Gaimard, 1832)	E, K, U	
Platydoris scabra (Cuvier, 1804)	B	Marcus 1965
	E, K	
Jorunna alisonae Marcus, 1976	E	Young 1967
**Jorunna funebris* (Kelaart, 1858)	E, K	
**Discodoris fragilis* (Alder and Hancock, 1864)	E	
**Trippa intecta* (Kelaart, 1858)	R	
"*Halgerda elegans* Bergh" Marcus, 1965	R	Marcus 1965
**Halgerda elegans* Bergh, 1905	K	
**Halgerda wasinensis* Eliot, 1904	E	
**Sclerodoris paliensis* Bertsch and Johnson, 1982	E	
**Aldisa pikokai* Bertsch and Johnson, 1982	K	
Casella atromarginata (Cuvier, 1804)	B	Marcus 1965
	E, K	
**Chromodoris albopunctatus* (Garrett, 1879)	E	
Chromodoris albopustulosa (Pease, 1860)	E	Young 1967
	K	
Chromodoris briqua Marcus and Burch, 1965 (?)	E	Marcus and Burch 1965
**Chromodoris decora* (Pease, 1860)	B, E, K	
**Chromodoris elisabethina* Bergh, 1877	E, K	
Chromodoris fidelis (Kelaart, 1858)	E	Marcus and Burch 1965
	B, K	
Chromodoris geometrica Risbec, 1928	E	Young 1967
	K	
Chromodoris inornata Pease, 1871	E	Young 1967
	B, K	
**Chromodoris marginata* (Pease, 1860)	B, E	
**Chromodoris tryoni* (Garrett, 1873)	E, K	
**Hypselodoris australis* (Risbec, 1928)	E, K	
**Hypselodoris decorata* (Risbec, 1928)	E, K	
**Hypselodoris infucata* (Rüppell and Leuckart, 1828)	E	
Hypselodoris kayae Young, 1967	E	Young 1967
Hypselodoris mouaci (Risbec, 1930)	E	Marcus and Burch 1965
	K	
**Thorunna clitonata* (Bergh, 1905)	E	
**Thorunna decussata* (Risbec, 1928)	E, K	
**Thorunna norba* (Marcus and Marcus, 1970)	E	
**Cadlinella ornatissima* (Risbec, 1928)	B, E, K	
**Dendrodoris coronata* Kay and Young, 1969	E, K, R	
**Dendrodoris elongata* Baba, 1936	B, E, K	
Dendrodoris erubescens (Bergh, 1905)	E	Marcus and Burch 1965
Dendrodoris nigra (Stimpson, 1855)	E	Marcus and Burch 1965; Young 1967
	B, K, U	
**Dendrodoris tuberculosa* (Quoy and Gaimard, 1832)	K	
**Gymnodoris ceylonica* (Kelaart, 1858)	E	

TABLE 1 (*Cont.*)

OPISTHOBRANCH SPECIES	ATOLL	SOURCE
Gymnodoris citrina (Bergh, 1877)	E	Marcus and Burch 1965; Young 1967
	B, K	
**Gymnodoris okinawae* Baba, 1936	E, K	
**Gymnodoris plebeia* (Bergh, 1877)	E	
**Gymnodoris striata* (Eliot, 1908)	E	
**Nembrotha kubaryana* Bergh, 1877	K	
**Plocamopherus ceylonicus* (Kelaart, 1858)	E	
**Aegires villosus* Farran, 1905	E	
**Goniodoris joubini* Risbec, 1928	B, E, K	
**Goniodoridiella savignyi* Pruvot-Fol, 1933	E	
Okadaia elegans Baba, 1931	E	Young 1967, 1969
Phyllidia nobilis (Bergh, 1869)	R	Marcus 1965
**Phyllidia pustulosa* Cuvier, 1804	B, E, K	
Phyllidia varicosa Lamarck, 1801	B	Marcus 1965
	E, K	
**Dermatobranchus fortunata* (Bergh, 1888)	E, K	
**Bornella adamsii* Gray, 1850	E, K	
**Marianina rosea* (Pruvot-Fol, 1930)	B, E, K, U	
Flabellina alisonae Gosliner, 1980	E	Gosliner 1980
	B, K, U	
Phestilla lugubris (Bergh, 1870)	E	Switzer 1971
	K	
**Favorinus japonicus* Baba, 1949	E, K	
**Phyllodesmium hyalinum* Ehrenberg, 1831	E, K	
Pteraeolidia ianthina (Angas, 1864)	E	Switzer 1971
	K	
**Phidiana bourailli* (Risbec, 1928)	E, K	
**Phidiana indica* (Bergh, 1896)	E, K	
Herviella claror Burn, 1963	E	Marcus and Burch 1965; Young 1967
Herviella mietta Marcus and Burch, 1965	E	Marcus and Burch 1965; Young 1967
**Glaucus atlanticus* Forster, 1777	E, K	
**Spurilla major* (Eliot, 1903)	E	

NOTE: A = Arno, B = Bikini, E = Enewetak, K = Kwajalein, R = Rongelap, and U = Ujelang. A new record for the Marshall Islands is denoted by *.

Specimens and color slides of most of the species discussed have been deposited in the collections of the Bernice P. Bishop Museum, Honolulu, Hawaii, and the Mid Pacific Research Laboratory, Enewetak, Marshall Islands.

DESCRIPTION OF SPECIES

ORDER CEPHALASPIDEA
FAMILY APLUSTRIDAE

Hydatina amplustre (Linnaeus, 1758)

REFERENCE: Kay (1979); Bertsch and Johnson (1981: 16).

MATERIAL: Empty shells are occasionally found on Enewetak Atoll lagoon reefs and beaches.

DISTRIBUTION: Indo-west Pacific (Kay 1979).

Hydatina physis (Linnaeus, 1758)

REFERENCE: Kay (1979); Bertsch and Johnson (1981: 16).

MATERIAL: One specimen, 20 × 12 mm, Enewetak, Bokandretok-Medren reef, in sand, depth 8 m, 20 Nov. 1981, P. Colin and L. Bell.

DISTRIBUTION: Indo-west Pacific, parts of tropical Atlantic (Kay 1979).

Micromelo guamensis (Quoy and Gaimard, 1825)

REFERENCE: Kay (1979); Bertsch and Johnson (1981: 17).

MATERIAL: One specimen, 25 × 10 mm, Enewetak, lagoonside Jedrol Island, on sand, 13 m, 21 August 1981, A. Thresher. One specimen, photographed at Kwajalein, D. Johnson.

DESCRIPTION: Marshall Islands specimens differ from Hawaiian conspecifics in having a yellowish-white foot and cephalic shield margins, which fade submarginally into a thin line of bright green, then into a wide, almost irridescent band of bluish-purple.

DISTRIBUTION: Pacific, including Hawaii, Guam, Japan, and Australia (Kay 1979).

FAMILY BULLIDAE

Bulla vernicosa Gould, 1859

REFERENCE: Kay (1979); Johnson (1982: 89).

MATERIAL: Empty shells are common on lagoon beaches at Enewetak. Occasional specimens crawl on sand or dead coral at night.

DISTRIBUTION: Pacific (Kay 1979).

FAMILY AGLAJIDAE

Chelidonura inornata Baba, 1949

REFERENCE: Baba (1949); Rudman (1970); Johnson (1982: 88).

MATERIAL: Six specimens, Enewetak, Medren Pier pilings, 5 m, 6 July and 15 July 1981. One specimen, collected and photographed at Kwajalein, D. Johnson.

DESCRIPTION: Marshall specimens possess two diffuse, light-blue patches on the anterior edge of the white band on the cephalic shield which are not mentioned in previous reports.

DISTRIBUTION: Japan (Baba 1949), Australia (Burn 1966), the Solomon Islands (Rudman 1970), Guam (Carlson and Hoff 1981), and the Caroline Islands (Marcus 1965).

Philinopsis gardineri (Eliot, 1903*a*)

REFERENCE: Bergh (1905: tafel 3, fig. 6, as *Chelidonura velutina*).

MATERIAL: One specimen, 30 mm, Enewetak, lagoonside Mut Island, under dead coral, 5 m, 30 November 1978. One specimen, photographed at Kwajalein, D. Johnson.

DESCRIPTION: Body broad, rounded anteriorly, and notched posteriorly, with lateral parapodia held upright. Color jet black with brilliant blue parapodial margins.

DISTRIBUTION: East Africa (Eliot 1903*a*), Indonesia (Bergh 1905), and Guam (Carlson and Hoff 1981).

REMARKS: Eliot's (1903*a*) description was of a preserved specimen and does not mention the blue margins. Switzer (1971) may have been referring to this species when she reported *Chelidonura velutina* Bergh, 1905, from Enewetak. As Rudman (1973*a*) has pointed out, Bergh's species is actually a combination of two previously described species, *Philinopsis gardineri* and *Chelidonura varians* Eliot, 1903.

FAMILY GASTROPTERIDAE

Sagaminopteron psychedelicum Carlson and Hoff, 1974

REFERENCE: Carlson and Hoff (1974: pl. 10, fig. 4).

MATERIAL: One specimen, photographed at Kwajalein, D. Johnson.

DISTRIBUTION: Guam, northern Marianas Islands (Carlson and Hoff 1974).

ORDER ANASPIDEA

FAMILY APLYSIIDAE

Aplysia parvula Guilding in Mörch, 1863

SYNONYMY: See Eales (1960).

REFERENCE: Bebbington (1977).

MATERIAL: Specimens are common beneath dead coral on the intertidal reefs of Enewetak and Kwajalein.

DESCRIPTION: Marshall Islands specimens are brownish, becoming yellow-brown toward the foot. Body densely covered with small white spots and a few irregularly scattered white patches. Tail and parapodial margins, the anterior edge of the foot, and rhinophore and tentacle tips black. Black patches densely flecked with white surround the eyes, just anterior to the rhinophores. Approximately one-third of the amber-yellow shell exposed through a circular, black-rimmed opening in the mantle. Radula as figured by Bebbington (1977).

DISTRIBUTION: Circumtropical, including Indo-west Pacific (Bebbington 1974, 1977), the tropical western Atlantic (Marcus 1956), and England (Bebbington and Brown 1975).

Dolabella auricularia (Lightfoot, 1786)

REFERENCE: Bebbington (1977); Kay (1979).

MATERIAL: About 50 individuals observed at Enewetak and Kwajalein, usually beneath rocks on lagoon reefs and pinnacles, often with grayish-green, spaghettilike egg masses.

DISTRIBUTION: Circumtropical (Engle 1942, Bebbington 1974, 1977).

Stylocheilus longicaudus (Quoy and Gaimard, 1825)

REFERENCE: Bebbington (1977); Fielding (1979; 51); Kay (1979).

MATERIAL: This species is one of the most frequently observed of all the opisthobranchs at Enewetak. The animals are found abundantly with the alga *Lyngbya*, on and under dead coral rocks and on sandy bottoms from the intertidal to depths of at least 30 m. They often occur in large groups. A dense aggregation of many thousands of individuals, piled several deep in places, crawling across silty sand, was observed off Runit Island at a depth of 24 m on 2 August 1981 (Colin and Kirby, pers. comm.).

DEVELOPMENT: Egg masses are frequently found beneath rocks with groups of *Stylocheilus* and consist of irregular tangles of brown spaghettilike strands, often very firmly attached to the substrate. Three to five ova, each measuring about 60 μm, occur in each capsule of 170 μm in diameter. Free swimming veliger larvae begin hatching in 5 days. Larval shells are transparent tan in color, with brown columellae.

DISTRIBUTION: Circumtropical (Engle and Hummelinck 1936, Bebbington 1974, 1977).

ORDER SACOGLOSSA

FAMILY HERMAEIDAE

Stiliger smaragdinus Baba, 1949

REFERENCE: Baba (1949: pl. 7, fig. 22).

MATERIAL: One specimen, 22 × 5 mm, Enewetak, Medren Pier pilings, on algae, 5 m, 6 July 1981.

DESCRIPTION: Body elongate, densely covered with inflated, ceratalike pallial processes. Base of each process translucent with light blue-green spots; distal three-fourths of each process green with opaque white patches and dense black freckling near the tip. Head green, rhinophores long, smooth, green with white tips. Rhinophoral bases with several lines of white speckles extending posteriorly. Radula as figured by Baba (1949).

DISTRIBUTION: Japan (Baba 1949).

FAMILY PLAKOBRANCHIDAE

Plakobranchus ocellatus van Hasselt, 1824

REFERENCE: Kay (1949); Bertsch and Johnson (1981: 20, 21).

MATERIAL: Common in sand and rubble areas on shallow lagoon reefs at Enewetak,

Bikini, Kwajalein, and Ujelang. Specimens frequently observed crawling exposed on the substrate.

DISTRIBUTION: Indo-west Pacific (Kay 1979).

Elysia bayeri Marcus, 1965

REFERENCE: Marcus (1965); Carlson and Hoff (1978).

MATERIAL: More than 100 specimens observed at Enewetak and Kwajalein, under and on dead coral on lagoon reefs and pinnacles, at depths of 3–10 m.

DEVELOPMENT: An egg mass was deposited by a 16 mm individual on 16 December 1981. Ova orange, about 80 μm individually within capsules 120–140 μm in diameter. Ova deposited in close-set whorls, coiled singly around an orange extra capsular yolk string; about 29 ova per mm and 2500 in the entire mass.

DISTRIBUTION: Bikini (Marcus 1965), Guam, and Palau (Carlson and Hoff 1978).

Elysia halimedae MacNae, 1954

REFERENCE: MacNae (1954); Carlson and Hoff (1978).

MATERIAL: One specimen, 12 × 2 mm, Enewetak, lagoonside Enewetak Island, on *Halimeda*, 3 m, 11 October 1981.

DISTRIBUTION: Indo-west Pacific, including South Africa (MacNae 1954), Japan (Baba 1957), Australia (Burn 1972), Guam, Ponape (Carlson and Hoff 1978), and Hawaii (Kay 1979).

Elysia livida Baba, 1955

REFERENCE: Carlson and Hoff (1978); Abe (1964: pl. 11, fig. 39).

MATERIAL: Two specimens, 15 × 2 mm, 14 × 2 mm, Enewetak, lagoonside Enewetak Island, on dead coral, 2–5 m, 26 June 1981 and 26 August 1982.

DESCRIPTION: Body elongate, smooth. Parapodia upright in slightly wavy folds, touching only intermittently middorsally. Color dark gray-black, the parapodial margins vivid orange, submarginally with a black band and a line of brilliant turquoise. Base of each rhinophore with a patch of the same color sequence. Coloration within the parapodia as on the outer surface. Radula as figured by Baba (1955) and Carlson and Hoff (1978).

DISTRIBUTION: Japan (Baba 1949), Guam (Carlson and Hoff 1978).

REMARKS: There may be some confusion as to the identity of this species. Our animals differ in color from those originally described by Baba (1955) (that is, of bluish-black animals with black, orange-red, and black bands on the parapodial margins) but have a similar radula. Abe's (1964) redescription of the animals of *E. livida* is, however, identical with our specimens, as is the color description by Carlson and Hoff (1978) of animals from Guam. There is an elysiid which occurs at Enewetak and at Guam (Carlson and Hoff 1978) with coloration similar to that of Baba's (1955) original description of *E. livida* but which has a different radula.

Elysia marginata Pease, 1871

REFERENCE: Carlson and Hoff (1978).

MATERIAL: Four specimens, the largest 45 mm in length, found at Rongelap and Enewetak, on or under dead coral at depths of 2–3 m.

DISTRIBUTION: Indo-west Pacific (Carlson and Hoff 1978).

Elysia obtusa Baba, 1938

Figure 1

REFERENCE: Carlson and Hoff (1978); Baba (1949: pl. 9, figs. 28, 29).

MATERIAL: Three specimens, the largest 12 × 2.5 mm, found on lagoon reefs and pinnacles of Enewetak and Bikini, at depths of 2–15 m. One specimen observed crawling in the open at night.

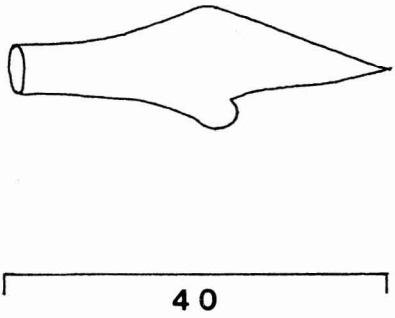

FIGURE 1. *Elysia obtusa* Baba. Single radular tooth (scale bar in μm).

DESCRIPTION: Radula of a 12 mm specimen with seven teeth in the ascending series and seven in the descending. The teeth (Figure 1) differ from those figured by Baba (1949) in being slightly more humped dorsally and lack the minute serrations described by Carlson and Hoff (1978).

DISTRIBUTION: Japan (Baba 1938, 1949), Guam (Carlson and Hoff 1978).

Elysia ratna Marcus, 1965

REFERENCE: Marcus (1965); Carlson and Hoff (1978).

MATERIAL: More than 100 specimens, ranging to 28 × 3 mm, observed on Enewetak and Kwajalein lagoon reefs and pinnacles, at depths of 2–20 m.

DEVELOPMENT: Egg masses deposited by 14 and 15 mm individuals on 20 November 1981. Ova orange, measuring 80–85 μm individually within relatively large capsules 190 μm in diameter. Ova spiralled singly around an orange extra capsular yolk string. About 20 ova per mm of coil, and 2250 in the entire mass.

DISTRIBUTION: Palau (Marcus 1965), Guam (Carlson and Hoff 1978).

Elysia vatae Risbec, 1928

REFERENCE: Carlson and Hoff (1978); Risbec (1928: pl. 12, fig. 7).

MATERIAL: More than 50 specimens, measuring up to 16 × 2.5 mm, recorded at Enewetak and Kwajalein, usually on or under algal-covered dead coral in 1–10 m of water, on both lagoon reefs and pinnacles.

DESCRIPTION: Body smooth; parapodia meet middorsally in a straight line extending to the tail. Aspects of the coloration vary between individuals; usually light to dark gray, with numerous black spots and fewer yellow spots; parapodial margins with a narrow to wide band of light yellow; rhinophores white, upper third orange-red. Radular teeth as figured by Carlson and Hoff (1978).

DEVELOPMENT: An 11 mm specimen deposited an egg mass 7 December 1981 and two more on 12 December 1981. Ova bright orange, arranged in six close-set whorls coiled flat on the substratum. Ova measure 55–65 μm individually within capsules 120 μm in diameter. Capsules piled in two layers around an orange extra capsular yolk string. Larvae begin hatching in 5 days as free-swimming veligers with transparent shells.

DISTRIBUTION: New Caledonia (Risbec 1928), Indonesia (Bergh 1905, as *Elysia* sp.), Guam, the northern Marianas, and Palau (Carlson and Hoff 1978).

REMARKS: Risbec (1928) figured this species as *Elysia vatae* and described it as *Elysia vataae*. Since the figure precedes the description, we follow Carlson and Hoff (1978) in using the former spelling.

FAMILY OXYNOEIDAE

Oxynoe viridis (Pease, 1861)

REFERENCE: Hamatani (1980); Baba (1955: pl. 2, figs. 3, 4, 5).

MATERIAL: One specimen, 21 × 6 mm, Rongelap, lagoonside Maen Island, under dead coral, 1 m, 12 September 1982.

DISTRIBUTION: Indo-west Pacific, including Tahiti (Pease 1861), Australia (Allan 1950, as *O. olivacea* Rafinesque), Japan (Baba 1952), and Zanzibar (Eliot 1906*a*).

ORDER NOTASPIDEA

FAMILY PLEUROBRANCHIDAE

Berthellina citrina (Rüppell and Leuckart, 1828)

SYNONYMY: See Burn (1962); Thompson (1970).

REFERENCE: Thompson (1970); Bertsch and Johnson (1981: 26, 27).

MATERIAL: Relatively common at Enewetak and Kwajalein, under dead coral on lagoon reefs and pinnacles at depths of 1–10 m. Individuals frequently observed preying on sponges and scleractinean corals in ledges and caves at night.

DESCRIPTION: Jaw elements of our specimens differ slightly from those reported by Thompson (1970) in having more regularly arranged and rounded, rather than pointed, denticulations.

DISTRIBUTION: Indo-west Pacific, the Mediterranean, the Atlantic coast of France, and the southern part of Great Britain (Thompson 1970).

ORDER NUDIBRANCHIA

FAMILY HEXABRANCHIDAE

Hexabranchus sanguineus (Rüppell and Leuckart, 1828)

REFERENCE: Thompson (1972*a*); Bertsch and Johnson (1981: cover).

MATERIAL: One specimen, 180 mm, Enewetak, washed ashore on the oceanside of Enewetak Island, 30 December 1981, R. Dubin. One specimen, 45 mm, Kwajalein, oceanside Ennubuj Island, under dead coral, 10 m, 3 March 1982.

DISTRIBUTION: Indo-west Pacific (Thompson 1972*a*).

REMARKS: *Hexabranchus sanguineus* was reported from Enewetak by Marcus (1965) as *H. marginatus* (Quoy and Gaimard 1832).

FAMILY DORIDIDAE

Platydoris cruenta (Quoy and Gaimard, 1832)

Figure 2

REFERENCE: Risbec (1928); Bergh (1905: tafel 1, fig. 3).

MATERIAL: One specimen, 70 × 46 mm (damaged), Enewetak, Mooring Buoy pinnacle, under dead coral, 4 m, 8 August 1981. One specimen, 51 × 32 mm, Kwajalein, Gagan Quarry, under dead coral, 2 m, 15 June 1982, L. Rousseau. One specimen, 95 × 61 mm, Kwajalein, Kwajalein intertidal reef, under dead coral, 21 June 1982, R. Alderson. One specimen, Ujelang, lagoonside Jereko Island, under dead coral, 1 m, 28 July 1982. One specimen, 100 × 53 mm, Kwajalein, Kwajalein intertidal reef, under dead coral, 14 September 1982, L. Bell.

DESCRIPTION: Mantle rigid, granular, flattened, and broadly oval with wide, flaring margins that cover the narrow foot. Coloration varies among individuals: typical specimens cream, densely streaked with short, curved, black lines and splotched with large orange or red spots; others with black streaks missing, and replaced by patches of fine, brown, sievelike reticulations. In the largest specimen from Kwajalein the reticulations were easily seen beneath the curved black lines. Elevated rhinophore sheaths white, edges scalloped; rhinophores white, each with about 40 lamellae varying from orange-red to gray-brown. Branchial pocket convoluted with six folds through which the six arborescent stalks protrude. Gills with white bases, grayish-brown, white-tipped branches.

Radular formulae of two specimens, both exceeding 80 mm in length, is 39 × 99.0.99 and 42 × 170.0.170. Teeth long, curved, pointed rods with slightly thickened bases (Figure 2).

DISTRIBUTION: New Guinea (Quoy and Gaimard 1832), Indonesia (Bergh 1905), Japan (Eliot 1913, Baba 1936, as *Argus cruentus*), New Caledonia (Risbec 1928), and Vietnam (Risbec 1956).

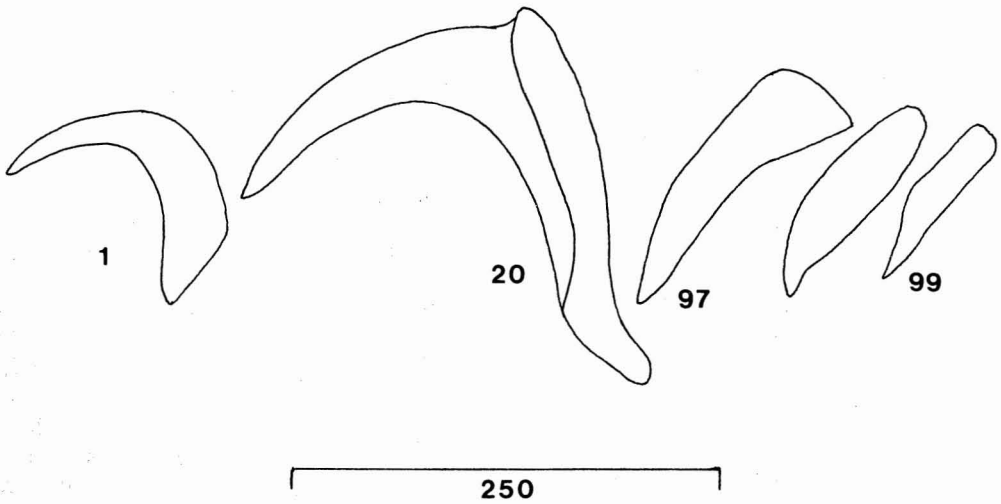

FIGURE 2. *Platydoris cruenta* (Quoy and Gaimard). Right-half row of radular teeth (scale bar in μm).

REMARKS: Our material indicates that *Platydoris cruenta* is variable both in coloration and in radular formula. Risbec (1928) and Eliot (1910) have also described color variation in *Platydoris* spp. Considering this variation, the validity of species similar to *P. cruenta*, such as *P. striata* (Kelaart, 1858), *P. sanguinea* Bergh, 1905, *P. flammulata* Bergh, 1905, and perhaps even *P. formosa* (Alder and Hancock, 1864) is suspect.

Platydoris scabra (Cuvier, 1804)

REFERENCE: Edmunds (1971).

MATERIAL: Six specimens, the largest 34 × 20 mm, observed beneath dead coral and in caves at night on lagoon pinnacles of Kwajalein and Enewetak, at depths of 10–15 m.

DESCRIPTION: Animals yellowish, densely speckled with tiny brown flecks, aggregated irregularly as brown blotches. Scattered about the dorsum, but more or less in a longitudinal row on each side of the middorsal line, are small patches of opaque white. External, radular, and reproductive system morphology as reported by Edmunds (1971).

DEVELOPMENT: A 30 mm individual deposited an egg mass in four whorls, loosely crenulate on the free edge. Ova bright orange, measuring about 80 μm individually within capsules 100 μm in diameter. Approximately 210 ova per mm^2 and 152,250 in the entire mass. Larvae hatched in 5 days as free-swimming veligers. The type-one larval shells were transparent with purple-stained columellae.

DISTRIBUTION: Indo-west Pacific (Edmunds 1971).

REMARKS: We have observed *Platydoris scabra* in Hawaii, where it is rare around the main islands but common within the lagoon of Kure.

Jorunna funebris (Kelaart, 1858*a*)

Figure 3

REFERENCE: Marcus (1976).

MATERIAL: About 20 specimens, ranging in size to 30 × 12 mm, found at Enewetak, mostly under dead coral on lagoon reefs and pinnacles. Seven specimens were feeding on a blue sponge, *Haliclona* sp. Two additional specimens, Kwajalein, J. and J. Wedge.

DESCRIPTION: Body broadly elongate oval, soft, and finely papillose with tiny, pointed caryophyllidia. Mantle margin wide, draping about the foot. Background color white.

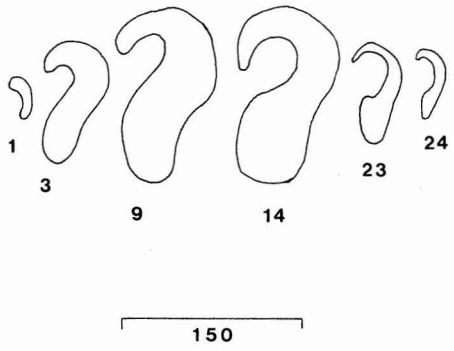

FIGURE 3. *Jorunna funebris* (Kelaart). Right-half row of radular teeth (scale bar in μm).

Caryophyllidia appearing brown to black, but minutely, densely flecked with chocolate-brown; some of the pigmentation spilling onto adjacent dorsal surface. Pigmented patches smaller around the margins. Foot white with occasional brown spots. Rhinophores white with about 18 dark brown to black lamellae. Branchiae of 4–6 long, tripinnate stalks, white, edged with dark brown or black.

Radular formula of a 30 mm individual 10 × 24.0.24. Teeth shaped like massive, smooth, cylindrical question marks (Figure 3). Tooth shape is similar to that of a specimen described by Marcus (1976), but appeared to be somewhat smoother and more regular.

DEVELOPMENT: An egg mass deposited by a 27 mm individual on 2 December 1981 consisted of three loose, white whorls, attached by one edge to the substrate. Ova measure approximately 170 μm within individual capsules 240 μm in diameter. About 75 ova per mm^2 and 21,900 in the mass. Larvae hatch in 5 days as free-swimming veligers with type-one shells. Larval shells pure white with purple stained columellae.

DISTRIBUTION: Indo-west Pacific (Marcus 1976).

REMARKS: The systematics of the known species as *Jorunna* were reviewed by Marcus (1976), who pointed out that the only reliable difference between *J. funebris* and *J. gigas* (Bergh, 1876) is the hook-shaped outermost teeth in the latter. Although these teeth in our specimens are definitely hooked, this difference seems insufficient to consider the two species separate and we retain the specific name *funebris*.

Discodoris fragilis (Alder and Hancock, 1864)

REFERENCE: Kay and Young (1969); Edmunds (1971); Bertsch and Johnson (1981: 40).

MATERIAL: More than 40 individuals, ranging to 85 × 50 mm, found at Enewetak, all beneath dead coral in 2–4 m of water on the lagoonside of Enewetak Island.

DEVELOPMENT: An egg mass deposited by an 85 mm specimen on 28 August 1981 was 70 mm in diameter, and crenulated on the free edge. Ova cream-white, measuring 80–90 μm in diameter, individually encased in capsules 120 μm in diameter. Approximately 86 ova per mm^2 and 3,160,500 in the mass. Free-swimming veligers begin to hatch in 4 days. The type-one larval shells were transparent tan with dark brown apertures.

DISTRIBUTION: Indo-west Pacific (Edmunds 1971).

Trippa intecta (Kelaart, 1858*a*)

REFERENCE: Edmunds (1971); Baba (1949; pl. 24, fig. 89).

MATERIAL: Four specimens, largest 40 × 22 mm, Rongelap, lagoonside Rongelap Island, beneath coral rubble, 2 m, 13 October 1981.

DISTRIBUTION: Indo-Pacific (Edmunds 1971), including Hawaii.

Halgerda elegans Bergh, 1905

Figure 4

REFERENCE: Bergh (1905: tafel 2, fig. 4a).

MATERIAL: One specimen, 12 × 3 mm, Kwajalein, Ninni Island, under dead coral, 8 m, 22 June 1981, K. DeGroff.

DESCRIPTION: Body rigid, gelatinous, reticulated with low ridges that intersect at

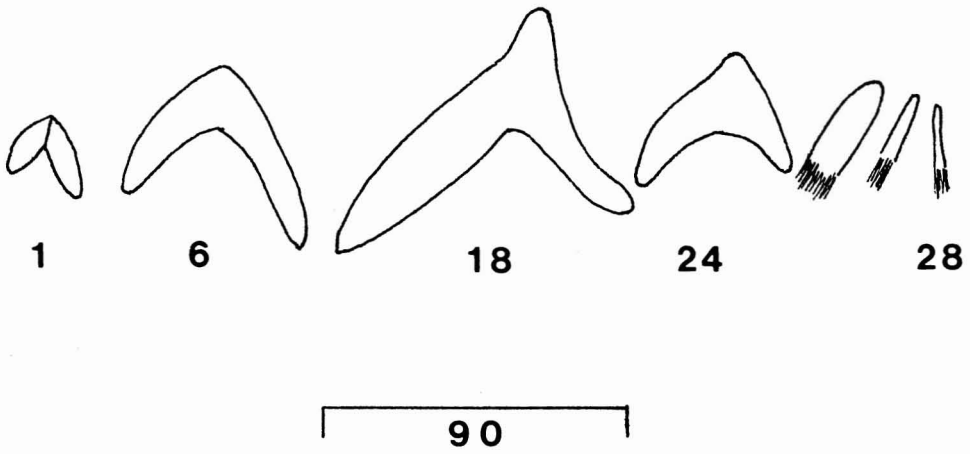

FIGURE 4. *Halgerda elegans* Bergh. Right-half row of radular teeth (scale bar in μm).

pointed tubercles. Background color bright lemon-yellow, with numerous, irregular, criss-crossing white lines, several of which usually intersect at the tubercles. Margin wide, rather thin, translucent white with numerous black spots and perpendicular streaks. Sides of foot and underside of the mantle whitish, spotted with black. Rhinophores with white peduncles, black clubs with white tips, and about 15 lamellae each. Branchiae white, splashed with black, of six bipinnate stalks.

Radular formula of the single specimen 29 × 28.0.28. Teeth mostly hamate (Figure 4), the outermost few straight and fringed with long, thin denticles.

DISTRIBUTION: Indonesia (Bergh 1905).

REMARKS: A nudibranch reported by Marcus (1965) as *Halgerda elegans* from Rongelap was "deep purple with white ring-like markings." This description bears no resemblance to our specimen, and we question Marcus' identification.

Halgerda wasinensis Eliot, 1904*a*

REFERENCE: Rudman (1978); Eliot (1904*a*: pl. 34, fig. 1).

MATERIAL: Four specimens, from 10 × 5 mm to 17 × 7 mm, collected at Enewetak, all under dead coral on lagoon pinnacles at a depth of 10 m.

DEVELOPMENT: A 15 mm specimen deposited an egg mass on 30 December 1981 in three loose whorls attached by one edge to the substrate. Ova orange-yellow, 190 μm individually within capsules 240 μm in diameter. Approximately 50 ova per mm^2 and 4000 in the entire mass examined. Free-swimming veligers begin to hatch in 5 days. The type-one larval shells were transparent tan with brown columellae.

DISTRIBUTION: East Africa (Eliot 1904*a*, Rudman 1978).

Sclerodoris paliensis Bertsch and Johnson, 1982

REFERENCE: Bertsch and Johnson (1981: 45, as *Sclerodoris* sp.; 1982).

MATERIAL: Three specimens, the largest 15 × 4 mm, found on lagoon pinnacles at Enewetak, under dead coral or exposed on the substrate at night, at depths of 10–12 m.

DISTRIBUTION: Hawaii (Bertsch and Johnson 1982).

Aldisa pikokai Bertsch and Johnson, 1982

REFERENCE: Bertsch and Johnson (1981: 44, as *Aldisa* sp.; 1982).

MATERIAL: One specimen, photographed at Kwajalein, D. Johnson.

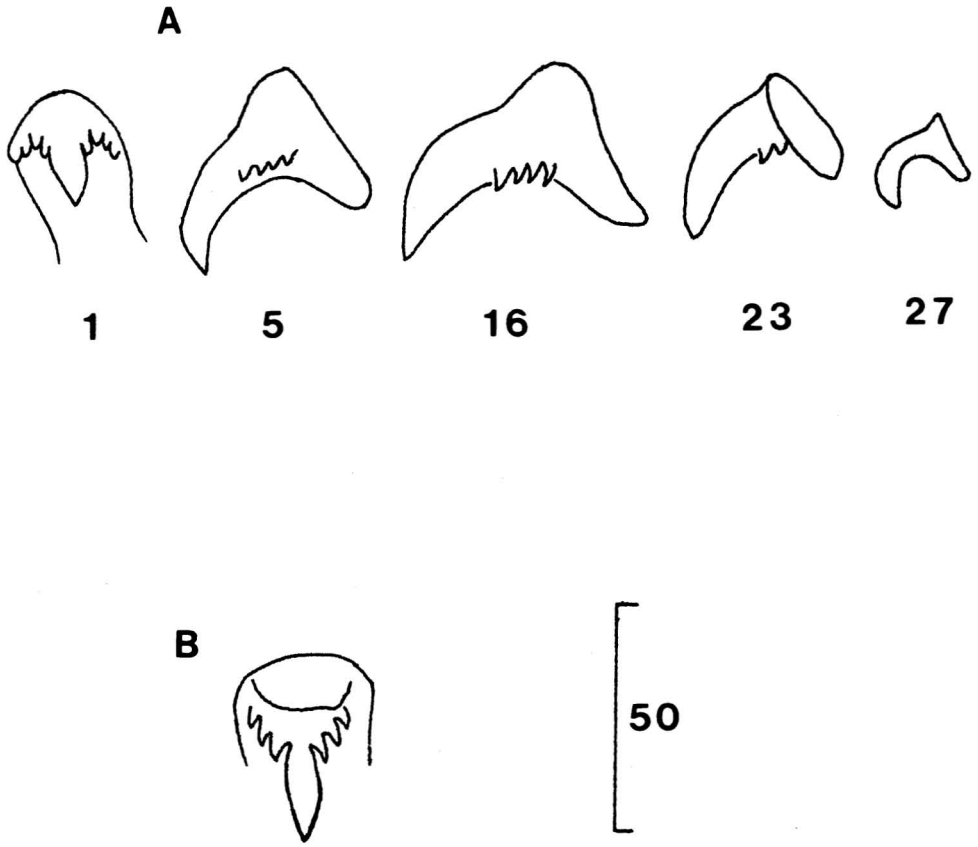

FIGURE 5. *Casella atromarginata* (Cuvier). *A*. Right-half row of radular teeth; *B*. Anterior view of innermost lateral tooth (scale bar in μm).

DISTRIBUTION: Hawaii (Bertsch and Johnson 1982).

FAMILY CHROMODORIDIDAE

Casella atromarginata (Cuvier, 1804)

Figure 5*A*, *B*

REFERENCE: Thompson (1972*b*; 1976: pl. 5, fig. C).

MATERIAL: Three specimens, the largest 25 × 6 mm, collected on and under dead coral on Enewetak lagoon pinnacles. Additional specimens from Kwajalein, D. Johnson.

DESCRIPTION: Radular formula of a 25 mm specimen 117 × 27.0.27. Innermost lateral with 3–4 denticles on either side of a long, main cusp (Figure 5A, B). Outer teeth hamate, each with up to four denticles on the outer surface. Outermost laterals small, simply hamate, smooth.

DISTRIBUTION: Indo-west Pacific, including Tahiti (Marcus and Marcus 1970), eastern Australia (Thompson 1972*a*), east Africa and the Red Sea (Eliot 1904*b*, Gohar and Aboul-Ela 1959), Japan (Baba 1949), Guam (Carlson and Hoff 1981), and the small northwestern Hawaiian Islands of Nihoa, French Frigate Shoals, Maro, and Laysan (pers. obs.).

Chromodoris albopunctatus (Garrett, 1879)

SYNONYMY: *Chromodoris imperialis* Kay and Young, 1969; Bertsch and Johnson, 1979*a* (non-Pease, 1860); *C. sykesi* Eliot, 1904.

REFERENCE: Kay and Young (1969); Bertsch and Johnson (1981: 58).

MATERIAL: Approximately 20 specimens, from 8 × 5 mm to 75 × 33 mm, found along shallow lagoon reefs and pinnacles at Enewetak. Most were beneath dead coral, feeding on an unidentified orange-yellow encrusting sponge.

DESCRIPTION: Our specimens exhibit more variation in color than those described by Garrett (1879), Eliot (1904*b*), and Kay and Young (1969). Large specimens usually reddish purple with white rings. Individuals approximately 30 mm and smaller, orange to red, with yellow, irregular rings (perhaps better described as yellow, densely spotted with orange or red). Margin tricolored with a wide band of bluish-purple, becoming a thin, irregular darker purple-black line submarginally, and a wide band of bright lemon-yellow. Bluish-purple marginal coloration also visible beneath the mantle, but fades into maroon submarginally. Underside, including the foot, bright lemon-yellow. Lower half of each rhinophore orange to light purple with red and white spots, becoming orange, red brown, or red-purple with white spots near the tip. Branchiae colored as the rhinophores. Animals in 70% ethanol become uniformly red-brown with a yellowish-orange pigment leaching into the preservative.

Radular tooth shape essentially as figured by Kay and Young (1969), although there are 2 inner denticles on the innermost laterals in our specimens, and occasionally, a faint, triangular central tooth.

DEVELOPMENT: Egg masses deposited by these dorids are unusual in having discrete extracapsular yolk bodies of irregular size and shape scattered throughout. For a discussion of the ova and development, see Boucher (in press).

DISTRIBUTION: Tahiti (Garrett 1979), East Africa (Eliot 1904*b*), and Hawaii (Kay and Young 1969).

REMARKS: Eliot's (1904*b*) *Chromodoris sykesi* agrees in all particulars with *C. albopunctatus*. The Hawaiian specimens of *C. albopunctatus* were reported as *C. imperialis* (Kay and Young 1969), a species that differs in coloration and external morphology, and may be synonymous with *C. godeffroyana* (Bergh, 1879). Marcus and Burch's (1965) description from Enewetak of *C. briqua* resembles small specimens of *C. albopunctatus* in coloration, and with the exception of the outermost teeth, the radulae of the two species are similar.

Chromodoris decora (Pease, 1860)

REFERENCE: Kay and Young (1969); Bertsch and Johnson (1981: 55).

MATERIAL: More than 75 specimens found at Enewetak, Kwajalein, and Bikini, mostly beneath dead coral on lagoon reefs at depths of 1–5 m.

DESCRIPTION: Marshall Islands specimens vary in two aspects of coloration: the purple spots on the dorsal white lines and marginal orange band are not always present, and the orange margin is frequently studded with white granules. Radular teeth similar to those figured by Kay and Young (1969), but differ in two minor respects: the mid-half row teeth have larger bases, and the innermost laterals possess two equal-sized inner denticles.

DEVELOPMENT: A loosely coiled egg mass was deposited on 28 August 1981 by a 13 mm individual. Ova cream-yellow, measuring 60–80 μm individually within capsules 95 μm in diameter. A bright orange extra capsular yolk body, 60 μm in diameter, situated like a cap external to the surface of each capsule. About 440 ova per mm^2 and 11,360 in the mass. Veliger larvae free swimming, with type-one shells.

DISTRIBUTION: Hawaii (Pease 1860; Kay and Young 1969), Guam (Carlson and Hoff 1981), eastern Australia (Allan 1947), and Japan (Baba 1938, as *Glossodoris setoensis*, 1953, 1955).

REMARKS: Kay and Young (1969) note that *Doris lentiginosa* Pease, 1871 from Tahiti may be a synonym.

Chromodoris elisabethina Bergh, 1877

REFERENCE: Johnson (1982: 92); Rudman (1982*a*: fig. 1G).

MATERIAL: More than 100 specimens observed on lagoon pinnacles and on the steep slopes of the seaward reef of Enewetak and Kwajalein, at depths of 8–20 m. Most are found in ledges and caves in sheer cliffs, and feed on two unidentified sponges, *Heteronema* sp. and *Dysidea* sp.

DESCRIPTION: Marshall Islands specimens match those reported by Rudman (1982*a*).

DEVELOPMENT: Egg masses deposited on 22 August 1981 were cream-yellow and coiled flat on the substrate rather than attached by one edge as is more typical of chromodorids. Ova cream-yellow, irregularly oval, measuring 75–105 μm individually within capsules 105–125 μm in diameter. Approximately 50 ova per mm^2 and 5000 within mass. Free-swimming veliger larvae with transparent type-one shells.

DISTRIBUTION: West Pacific (reviewed by Rudman 1982*a*).

Chromodoris fidelis (Kelaart, 1858*a*)

REFERENCE: Eliot (1906*b*).

MATERIAL: This is one of the most common nudibranchs at Enewetak. More than 200 individuals have been observed in a variety of habitats, usually beneath loose coral rubble on inshore lagoon reefs and pinnacles. It is not unusual to find 10 or more in a single search hour. Specimens have also been found at Kwajalein and Bikini. These animals prey on at least two sponge species, including *Aplysilla violacea* Lendenfeld, 1883.

DESCRIPTION: Typical coloration has been well figured in illustrations by Eliot (1906*b*) and as *Chromodoris flammulata* by Bergh (1905) and Risbec (1928). Marshall Island specimens frequently exhibit color variation not mentioned in previous studies: the irregularly wide submarginal band that is usually maroon varies from yellow to dark reddish-purple, and the rhinophores are of translucent white with gray-brown lamellae and distinct internal white cores. Branchial stalks 5–9, gray-brown with internal beads of opaque white.

DEVELOPMENT: Egg masses, described in detail by Boucher (in press), possess extra capsular yolk bodies similar to those of *Chromodoris decora*.

DISTRIBUTION: Sri Lanka (Kelaart 1858*a*), Indonesia (Bergh 1905), New Caledonia (Risbec 1928), Japan (Baba 1953), Enewetak (Marcus and Burch 1965), Guam (Carlson and Hoff 1981).

REMARKS: Marcus and Burch (1965) discussed the synonymy of this species. They followed Eliot (1909) and Pruvot-Fol (1951) in regarding *Chromodoris flammulata* Bergh, 1905, and *C. lactea* Bergh, 1905 as synonyms of *C. fidelis*. We agree that *C. fidelis* and *C. flammulata* are synonymous, but have some doubts about *C. lactea*. The alcohol-preserved *C. lactea* described by Bergh (1905) differs in rhinophore and gill coloration from our ethanol-preserved *C. fidelis*, and Bergh's radular figures of *C. flammulata* and *C. lactea* are far from identical. *Chromodoris lactea* should be regarded as a distinct species until living animals are found with preserved coloration and radular characteristics matching Bergh's description.

Chromodoris geometrica Risbec, 1928

Figure 6

REFERENCE: Risbec (1928).

MATERIAL: Over 60 specimens, ranging in length to 35 mm, have been found on Enewetak lagoon reefs and pinnacles, under dead coral in 2–15 m of water. Several were photographed by D. Johnson at Kwajalein. We have observed these chromodorids preying on at least two species of sponges, including *Aplysilla violacea*.

DESCRIPTION: Marshall Islands specimens dorsally light gray, with scattered compound white pustules. A dark purple-black line forms an irregular oval around the rhinophores and

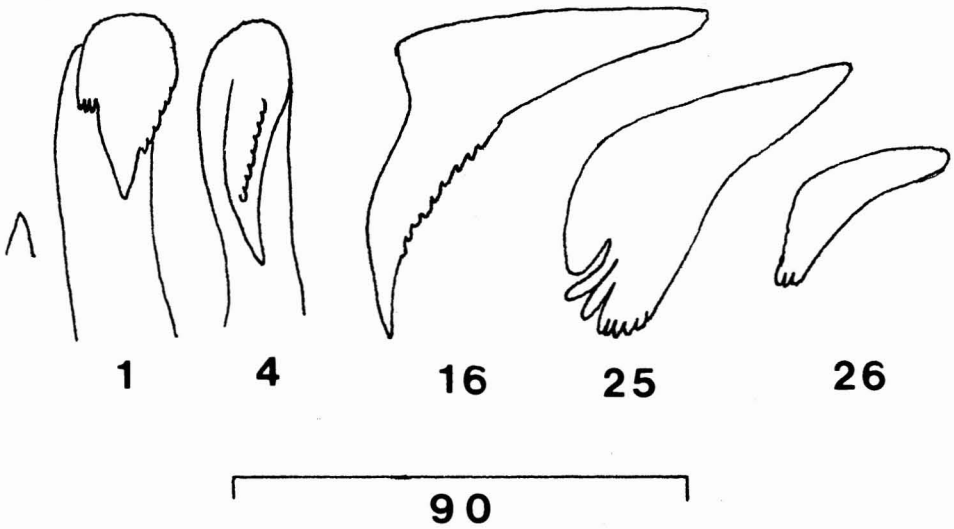

FIGURE 6. *Chromodoris geometrica* Risbec. Right-half row of radular teeth (scale bar in μm).

gills, usually connected middorsally by a transverse line of the same color. Nine to 14 diffuse purple-black lines radiate from the oval toward the margins. In larger specimens, purple-black areas are studded with bright white granules. Margin wide, white, thinly edged with purple anteriorly. Underside of mantle skirt translucent white, except anteriorly, where it is deep purple. Sides of foot with a longitudinal purple-black line on a grayish background. Rhinophores and branchiae yellow to green. In one of our specimens the gills were inverted, projecting downward from the underside of the posterior edge of the mantle, as described for *Chromodoridiella mirabilis* (Eliot 1905*a*).

Radular formula of a 14 mm specimen 32 × 26.1.26. Central tooth faint, present in only a few rows. Innermost laterals with a large cusp and three small inner and five to six outer denticles. Remaining teeth hamate with outer denticles (Figure 6).

DEVELOPMENT: Two loosely coiled egg masses deposited on 18 November 1981 were peach to orange in color. Ova white, measuring 90–105 μm individually within capsules 105–120 μm in diameter. Extra capsular yolk bodies orange, varying from small caps to masses nearly surrounding the capsules. About 500 ova per mm^2 and 12,000 in a typical mass.

DISTRIBUTION: New Caledonia (Risbec 1928), eastern Australia (Allan 1947), and Enewetak (Young 1967).

REMARKS: Rudman (1973*b*) records a *Chromodoris* cf. *geometrica* from East Africa that differs considerably in coloration from our specimens, and suggests that perhaps the coloration is quite variable. We feel that the differences in radular formulae, tooth shape, and external coloration are probably too extreme to consider Rudman's specimens conspecific.

Chromodoris inornata Pease, 1871

SYNONYM: *Chromodoris lilacina* Young, 1967; Kay and Young, 1969 (non-Gould, 1852).

REFERENCE: Rudman (1973*b*); Bertsch and Johnson (1981: 54, as *C. lilacina*).

MATERIAL: More than 75 specimens ranging in length to 35 mm, observed on shallow lagoon reefs of Enewetak, Kwajalein, and Bikini.

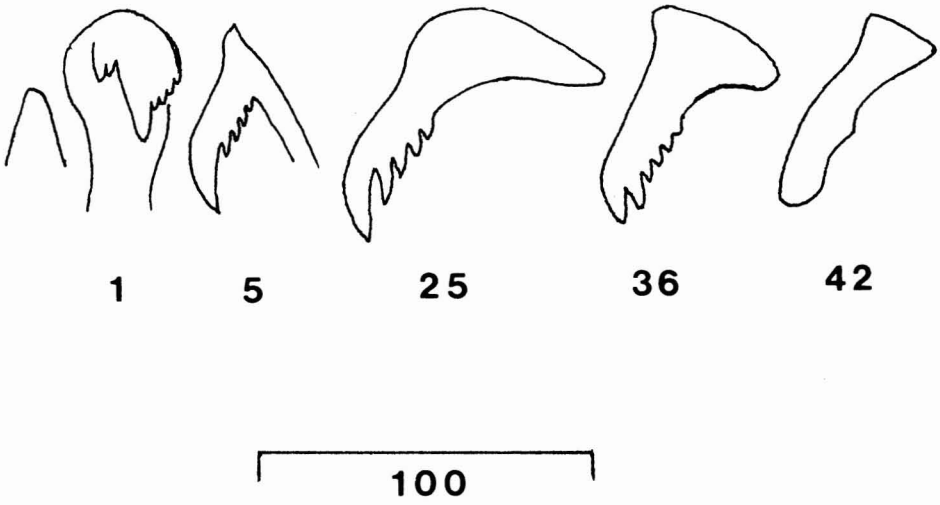

FIGURE 7. *Chromodoris marginata* (Pease). Right-half row of radular teeth (scale bar in μm).

DEVELOPMENT: On 12 December 1981, a 10 mm individual deposited an egg mass consisting of six close set, spiral whorls laid flat on the substrate. Ova light yellow measuring approximately 75 μm individually within capsules 90 μm in diameter. Free-swimming veliger larvae with transparent, type-one shells.

DISTRIBUTION: West Pacific (reviewed by Rudman 1973*b*), Enewetak (Young 1967), and Hawaii (Kay and Young 1969).

REMARKS: Specimens identical with these Marshall Islands chromodorids were reported from Enewetak (Young 1967) and Hawaii (Kay and Young 1969) as *Chromodoris lilacina* (Gould, 1852). However, Gould's *Doris lilacina* measured 85 mm in length, was lilac in coloration with large, discrete darker spots, and possessed feathery, tripinnate branchiae wider than the body. Young (1967) suggested that *Doris amabilis* Kelaart, 1858 and *Chromodoris porcata* Bergh, 1888 may be synonymous with his "*Chromodoris lilacina*," Both species are distinctly different in coloration from *C. inornata* and may represent separate species.

Chromodoris marginata (Pease, 1860)

Figure 7

REFERENCE: Kay and Young (1969, as *Chromodoris trimarginata*).

MATERIAL: More than 60 specimens have been found at Enewetak, and one at Bikini, mostly under dead coral rocks in 1–8 m of water along lagoon reefs. Individuals range to 34 mm in length. *C. marginata* feeds upon at least three sponge species, including *Aplysilla violacea* and *A. sulphurea* Schultz, 1878.

DESCRIPTION: Body soft, elongate oval, with a relatively wide mantle skirt draping down around the foot. Mantle usually bright white with maroon marginal and orange submarginal bands. Larger specimens with irregular, translucent, almost grayish spots on a slightly pustulose dorsum, and a bluish-white edging on the mantle margin. Rhinophores with transparent peduncles, light reddish clubs, each bearing 11–14 white lamellae. Seven to nine simply pinnate branchial stalks, light reddish with rachides and pinnae edged with white.

Radular formula of a 16 mm specimen, 44 × 42.1.42. Central tooth small, triangular, and inconspicuous in small individuals. Innermost laterals with a large cusp and two equal inner, and four to five outer denticles (Figure 7). Most remaining teeth sharply hooked, each with a long cusp and three to

five denticles near the curved posterior edge. Several teeth near the outermost nearly bicuspid, the first denticle as large as the cusp and larger than the remaining denticles. Outermost teeth with zero to three denticles.

Buccal elements curved bifid rods approximately 38 μm in length. Some appeared to be inflated just behind the forked end, and had thickened, sculptured bases.

DEVELOPMENT: An egg mass deposited by a 34 mm specimen on 30 January 1982 consisted of three loose whorls attached by one edge to the substrate. Ova bright yellow with orange, caplike extra capsular yolk bodies. Ova measuring about 125 μm individually within capsules 160 μm in diameter, arranged in rows perpendicular to the long axis of the ribbon. About 115 ova per mm^2 and 13,800 in the mass. Free-swimming veliger larvae with transparent, type-one shells.

DISTRIBUTION: Hawaii (Pease 1860; Kay and Young 1969), Indonesia (Bergh 1905), New Caledonia (Risbec 1928), India (Winckworth 1946), Japan (Baba 1953), Vietnam (Risbec 1956), and Australia (Thompson 1972*b*).

REMARKS: We are tentatively assigning Pease's name to this species, although our specimens differ from those reported by Kay and Young (1969) and Kay (1979) from the type locality in several respects: (1) the marginal bands of color are maroon and orange, instead of red-orange and yellow respectively; (2) the rhinophores and gills, which are white in the Hawaiian specimens, are tinted with red; (3) Enewetak specimens attain a larger size, becoming pustulose with grayish spots rather than smooth and white; (4) a central radular tooth is present; (5) the cusp is more prominent and the outer teeth are smoother; and (6) some of the buccal elements have inflated and sculptured portions. We consider our animals to be *Chromodoris marginata*, in part because of the apparent variability of the species, both at Enewetak and throughout the Indo-west Pacific. Specimens reported by Thompson (1972*b*) were white with a peppering of gray on the dorsum and had a red margin and gray rhinophores and gills. Bergh's (1905) specimen was yellowish and grayish dorsally and had a red margin and light violet rhinophores and gills. Winckworth's (1946) *C. trimarginata* had a white outer margin and red dorsal spots. The radulae also vary among all these specimens. Additional research may necessitate a reevaluation, but for the present we follow other authors in considering all of these records to be varieties of a single species.

Chromodoris tryoni (Garrett, 1873)

Figure 8

REFERENCE: Young (1967, as *Hypselodoris tryoni*).

MATERIAL: More than 40 specimens varying in size to 65 × 14 mm observed at Enewetak on the pilings at Medren Pier in 1–5 m of water, usually feeding on the sponge *Dysidea fragilis* (Montagu, 1818). A few additional individuals and pairs were found among dead coral rocks at Enewetak and Runit Islands and in a lagoon *Halimeda* patch near Enewetak. One specimen collected and photographed at Kwajalein by J. Hammon. Adults are usually paired and queue up when they move, the following individual placing the anterior edge of its foot on the tail of the leader and following directly behind.

DESCRIPTION: Our specimens differ from those of Young (1967) in certain aspects of radular tooth morphology. Young's figure of the radula shows a smooth, hamate innermost lateral divided into two small cusps at the tip. Although the teeth are difficult to distinguish because of crowding, none of the five specimens we examined possessed bicuspid innermost laterals. Instead, these teeth were hamate with three to four denticles on either side of an elongate main cusp (Figure 8), similar to those figured by Bergh (1879) for *Chromodoris tryoni*.

DEVELOPMENT: An egg mass deposited by a 55 mm specimen on 3 January 1982 consisted of four loose whorls crenulated on the free edge. Ova rose-pink measuring 110–120 μm individually within capsules 150 μm in diameter. About 90 ova per mm^2 and 130,000 in

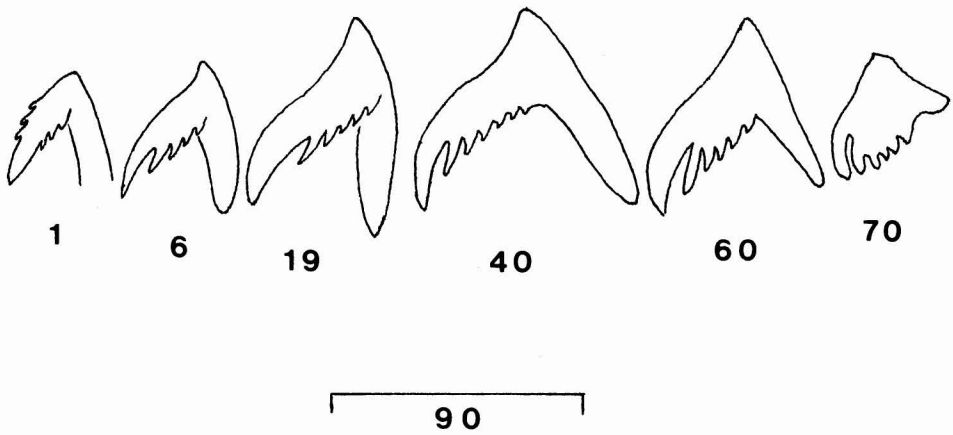

FIGURE 8. *Chromodoris tryoni* (Garrett). Right-half row of radular teeth (scale bar in μm).

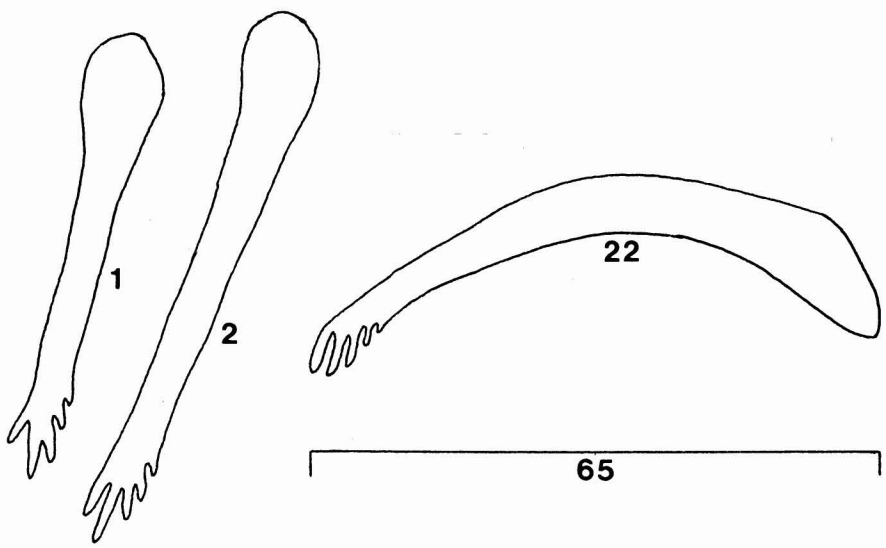

FIGURE 9. *Hypselodoris australis* (Risbec). Right-half row of radular teeth (scale bar in μm).

the entire mass. The larvae are free-swimming veligers.

DISTRIBUTION: Society Islands (Garrett 1973), Palmyra (Young 1967), and Guam (Carlson and Hoff 1981).

REMARKS: The buccal elements, reproductive system, and external shape of *Chromodoris tryoni* are clearly *Hypselodoris*-like (Young 1967, Rudman 1977). However, the morphology of the radular teeth traditionally determines the generic placement of chromodorids. Our radular dissections show unicuspid teeth, and we have, at least for the present, retained the genus *Chromodoris*.

Eliot (1904*b*) erroneously reported *C. tryoni* from east Africa; his specimen had orange spots and was probably *C. aureopurpurea* Collingwood, 1881. Despite Eliot's (1904*b*) suggestion that the two are synonymous, *C.*

tryoni and *C. aureopurpurea* differ sufficiently in shape and coloration that they cannot be considered conspecific.

Hypselodoris australis (Risbec, 1928)

Figure 9

SYNONYM: *Chromodoris australis* Risbec, 1928.

REFERENCE: Risbec (1928); Johnson (1982: 92).

MATERIAL: Over 75 specimens of this common species, ranging in length to 18 mm, were observed beneath dead coral lagoon reefs and on pinnacles. Individuals are often paired and are usually found feeding on an unidentified, encrusting, tan-colored sponge. Populations at Enewetak appear to fluctuate: specimens are far more common in summer and fall months. Specimens photographed at Kwajalein, D. Johnson and J. Wedge.

DESCRIPTION: Radular formula of a 9 mm specimen 38 × 22.0.22. Teeth long, narrow, and difficult to distinguish. Innermost laterals bifid with one to three inner and two to three outer denticles. Mid-half row teeth bifid or trifid with distinct outer denticulation (Figure 9).

DEVELOPMENT: An egg mass, cream-white, consisting of three loose whorls attached by one edge to the substrate, was deposited by a 16 mm individual on 12 December 1981. Ova measure about 80 μm individually within capsules 90 μm in diameter. About 325 ova per mm^2 and 35,000 in the mass. Free-swimming veliger larvae with transparent type-one shells begin hatching in 5 days.

DISTRIBUTION: New Caledonia (Risbec 1928), Guam (Carlson and Hoff 1981).

REMARKS: The narrow, elongate radular teeth are reminiscent of *Babaina* Odhner, 1968, but that genus is characterized by bifid teeth without denticulation (Bertsch 1977).

Hypselodoris decorata (Risbec, 1928)

Figure 10*A*, *B*

SYNONYM: *Chromodoris decorata* Risbec, 1928.

REFERENCE: Risbec (1928: pl. 7, fig. 4).

MATERIAL: Over 60 individuals ranging to 40 mm in length observed at Enewetak. They are usually found beneath dead coral rocks and in ledges along lagoon reefs and on pinnacles, as well as on the pier pilings at Medren Island. Specimens photographed at Kwajalein, D. Johnson. Enewetak specimens feed on at least two species of sponges, including *Dysidea fragilis*.

DESCRIPTION: Our specimens exhibited more color variation than indicated by Risbec (1928). Color cream-yellow middorsally, with a wide orange-red marginal band and a white submarginal line that widens at intervals forming fingers of white extending into the orange-red margin. Two additional longitudinal white lines beginning between the rhinophores and extending around the gills, sometimes connected by transverse white lines middorsally. Notum cream-yellow, usually with scattered carmine or purple spots, which are also present along the innermost edge of the orange-red margin; laterally, the orange-red marginal bands are scattered with opaque white granules in most, but not all, specimens. Sides of foot colored as the dorsum. Rhinophores cream-white, with three orange rings and 14–15 lamellae. Seven simply pinnate gill stalks, white with fine red lines and orange rachides and tips.

Radular formula of a 25 mm specimen 52 × 45.0.45. Teeth strongly bicuspid along the entire radular row, warranting placement of this species in the genus *Hypselodoris* (Figure 10A). Buccal elements of the same individual are short, stout, thickened, and ribbed near the top, each with single curved point at one end (Figure 10B).

DEVELOPMENT: Each of the several egg masses observed was deposited in one or two loose whorls, attached by one edge to the substrate. Ova rose-pink, measuring 80–90 μm individually within capsules 125 μm in diameter. The largest egg mass measured 105 mm in length and contained approxi-

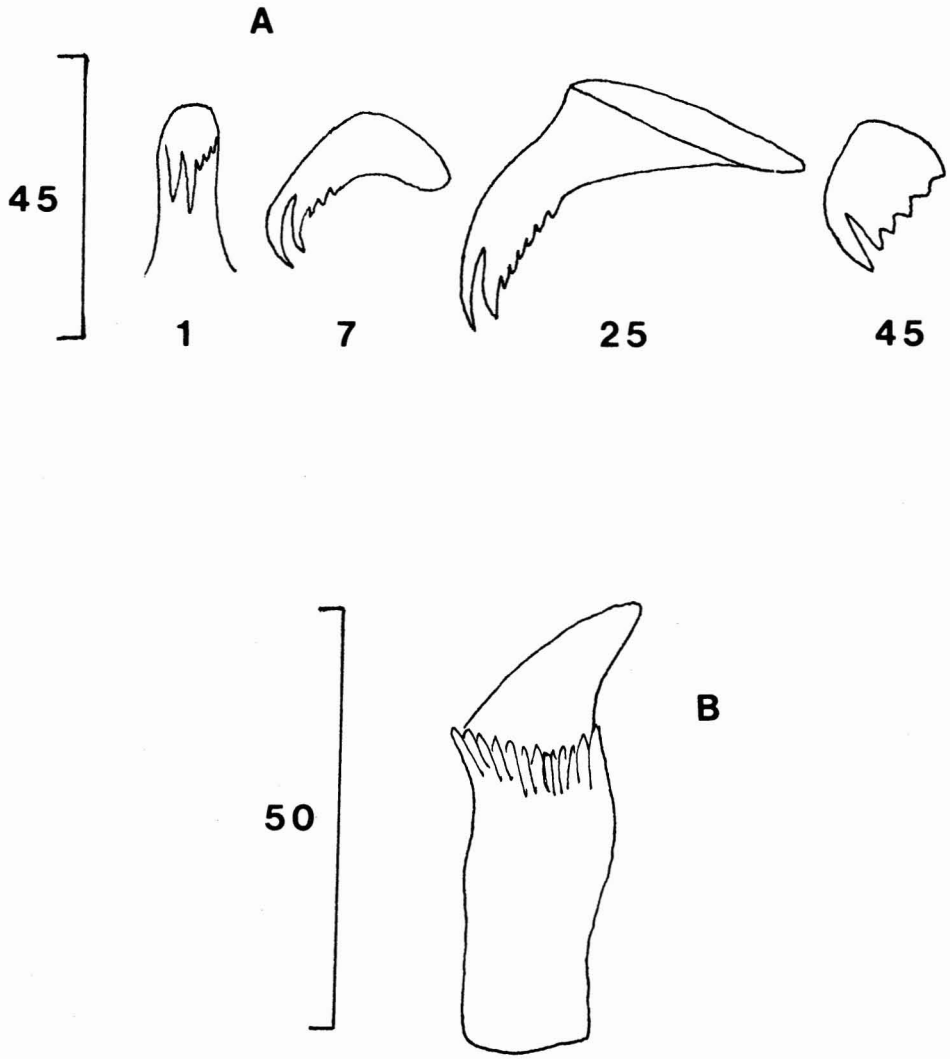

FIGURE 10. *Hypselodoris decorata* (Risbec). *A*. Right-half row of radular teeth; *B*. Buccal element (scale bars in μm).

mately 56,000 ova. Veliger larvae free-swimming with transparent type-one shells.

DISTRIBUTION: New Caledonia (Risbec 1928), Vietnam (Risbec 1956), and Guam (Carlson and Hoff 1981).

Hypselodoris infucata (Rüppell and Leuckart, 1828)

REFERENCE: Edmunds (1971); Rudman (1973*b*); Bertsch and Johnson (1981: 62, 63).

MATERIAL: Three specimens, the largest 35 × 7 mm, found on Enewetak lagoon reefs at depths of 5–8 m.

DESCRIPTION: Enewetak specimens with three wide longitudinal bands of white, separated by bands of gray that join anterior to the rhinophores. Gray bands usually irregularly splotched with yellow, and mantle with scattered purplish-black spots. Mantle margin edged with purple and submarginally with somewhat regularly spaced purplish-black

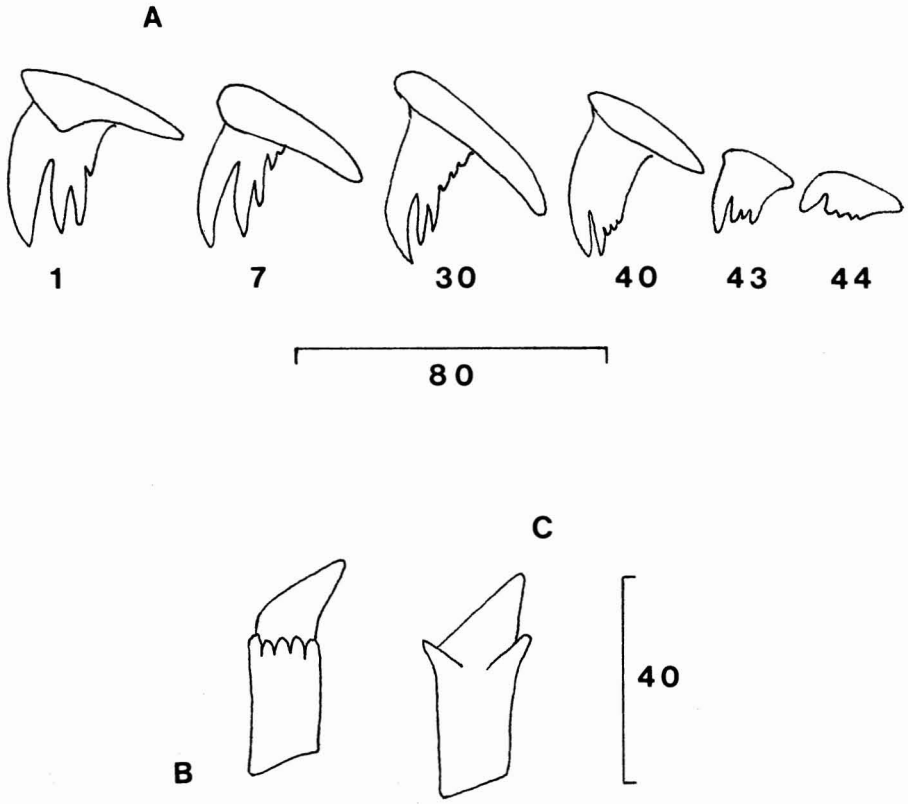

FIGURE 11. *Hypselodoris mouaci* (Risbec). *A*. Right-half row of radular teeth; *B, C*. Buccal elements (scale bars in μm).

spots surrounded by patches of lighter purple. Rhinophores with white peduncles and red clubs. Eleven to 13 branchial stalks whitish, edged with red. Radula and buccal armature as figured by Edmunds (1971).

DISTRIBUTION: Indo-west Pacific (Edmunds 1971, Rudman 1973*b*); Hawaii (Bertsch and Johnson 1979*b*).

Hypselodoris mouaci (Risbec, 1930)

Figure 11*A, B, C*

SYNONYMY: *Chromodoris mouaci* Risbec, 1930.
Hypselodoris hilaris Marcus and Burch, 1965 (non Bergh, 1890).

REFERENCE: Risbec (1930: pl. 1, fig. 2).

MATERIAL: Over 75 specimens observed at Enewetak, on pier pilings and dead coral on shallow lagoon reefs and pinnacles, to depths of 20 m. Specimens photographed at Kwajalein, D. Johnson and J. Wedge. Enewetak specimens range in length to 40 mm and are frequently observed feeding on the sponge *Dysidea fragilis*.

DESCRIPTION: Radular formula of a 32 mm individual 67 × 54.0.54, that of a 34 mm specimen, 62 × 44.0.44. Teeth strongly bicuspid (Figure 11*A*), the inner ones with long, pointed cusps and thickened bases. Outermost teeth rather squat, with small, rounded denticles on the posterior edge. Buccal elements short and thickened, with a single large point on one

end. Thickening on the shaft most commonly as in Figure 11*B*; occasionally, with one or two subpoints as in Figure 11*C*, and as described by Marcus and Burch (1965).

DEVELOPMENT: An egg mass deposited by a 23 mm individual on 18 November 1981 consisted of a loose, irregular, brown coil, crenulated on its free edge. Ova orange, measuring 95–120 μm individually within capsules only slightly larger. About 150 ova per mm² and 45,000 in the entire coil. Larvae are free-swimming veligers with type-one shells.

DISTRIBUTION: New Caledonia (Risbec 1930), Enewetak (Marcus and Burch 1965).

REMARKS: Marcus and Burch (1965) erroneously identified this species as *Hypselodoris hilaris* (Bergh, 1890), a species that differs somewhat in external coloration. The specimens Baba (1953) identified as *Glossodoris hilaris* from Japan may also represent *H. mouaci*.

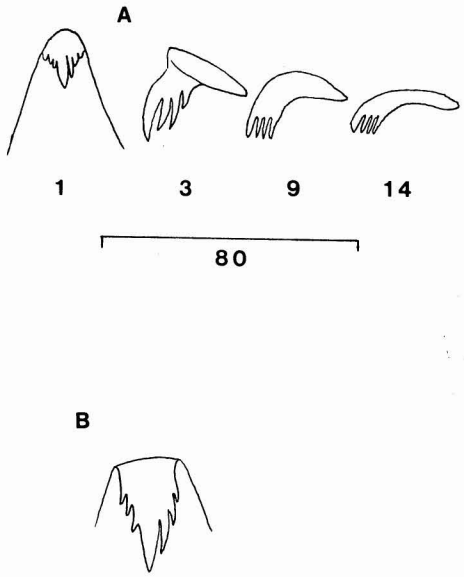

FIGURE 12. *Thorunna clitonata* (Bergh). *A*. Right-half row of radular teeth; *B*. Anterior view of innermost lateral tooth (scale bar in μm).

Thorunna clitonata (Bergh, 1905)

Figure 12*A*, *B*

SYNONYM: *Chromodoris clitonata* Bergh, 1905.

REFERENCE: Bergh (1905: tafel 5, fig. 16).

MATERIAL: Four specimens, ranging from 4 × 1 mm to 12 × 2 mm, found on Enewetak lagoon reefs, under dead coral at depths of 1–4 m.

DESCRIPTION: In motion, the body is elongate and slender. Mantle margin bearing a wide white or light yellow band with a narrow, irregular, submarginal band of purple, and a wide middorsal white band from between the rhinophores to the gills. On either side of, and parallel to, the white band is a dark reddish-purple line, followed by a relatively narrow band of peach or orange, then a line of light reddish-purple. Light purple background nearly obscured by the dorsal color bands. Rhinophores with transparent peduncles and tricolored clubs: light purple at the tip, dark purple in the middle, and orange basally. Branchiae situated far posterior, and composed of eight simply pinnate, bladelike stalks set in a nearly complete circle; stalks pale orange at the base and purple at the tips.

Radular formula of an 8 mm specimen 27 × 14.0.14. Innermost laterals extremely wide with two or three denticles on either side of a large cusp (Figure 12*A*, *B*). Remaining teeth hamate, becoming only slightly curved by the outermost.

DEVELOPMENT: An egg mass deposited by a 12 mm specimen on 10 July 1982 consisted of a single white whorl attached by one edge to the substrate. Ova white, measuring 86 μm individually within capsules 100–115 μm in diameter.

DISTRIBUTION: Indonesia (Bergh 1905), Japan (Baba 1937*a*), eastern Australia (Thompson 1972*b*), and perhaps Guam (Carlson and Hoff 1981, as *Chromodoris* cf. *clitonata*), New Caledonia (Risbec 1928), and Vietnam (Risbec 1956).

REMARKS: Bergh (1878) erected the chromodoris genus *Thorunna* (= *Noumea* Risbec, 1928; see Bertsch 1977) for *T. furtiva* Bergh,

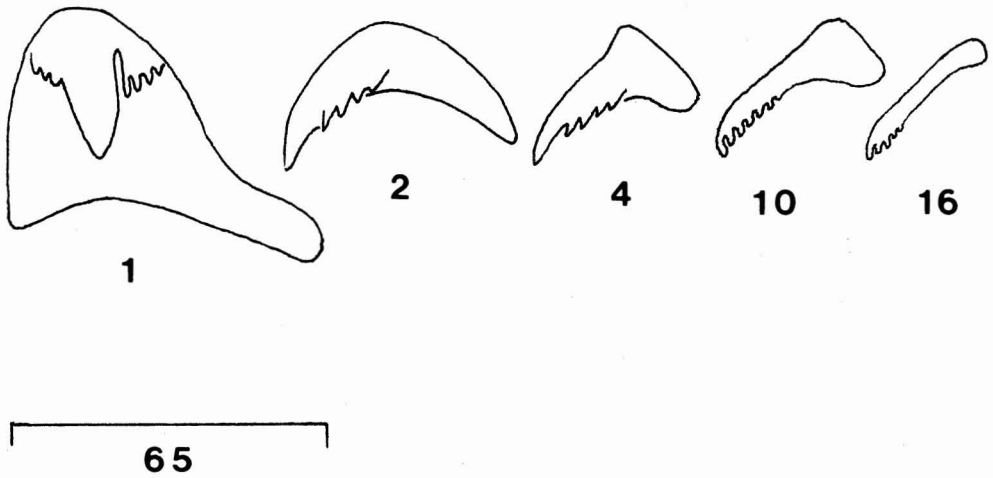

FIGURE 13. *Thorunna decussata* (Risbec). Right-half row of radular teeth (scale bar in μm).

1878, based on the wide innermost lateral teeth and lack of buccal armature. Buccal armature occurs in *T. clitonata* (see Bergh 1905) and in some other species with wide innermost laterals, but is sufficiently small that, if present in *T. furtiva*, it may have been overlooked. We retain *Thorunna* because the width of these innermost teeth seems at least as significant as the difference between unicuspid and bicuspid teeth, the primary characteristic used to differentiate *Chromodoris* and *Hypselodoris*.

Unfortunately, there is some confusion as to the identity of this and similarly colored species. Our specimens resemble the original description and figure by Bergh (1905), who states that the radula is typical of chromodorids, but gives no figure. The color figure and radula of Risbec's (1928) *Chromodoris clitonata* are quite different from those of our animals. Adding to the confusion, Pruvot-Fol (1951) considered *Glossodoris clitonata* synonymous with *G. scurra* (Bergh, 1874), *G. luxuriosa* (Bergh, 1875), *G. variegata* (Pease, 1871), *G. dorsalis* (Gould, 1852), and *G. lemniscata* (Quoy and Gaimard, 1832). Several of these species differ in size and/or coloration from our specimens. Clarification of the systematics requires comparison of living specimens and radulae of all these species or varieties.

Thorunna decussata (Risbec, 1928)

Figure 13

SYNONYMY: *Noumea decussata* Risbec, 1928.

REFERENCE: Risbec (1928: pl. 8, fig. 6).

MATERIAL: This is the most abundant of the Enewetak chromodorids. As many as 20 individuals were observed per search hour. Well over 300 individuals have been found, mostly on the lagoonside of Enewetak Island at 2–10 m, but some on lagoon reefs of other islands and on pinnacles. Their abundance fluctuates dramatically; almost none was observed during the late summer and fall of 1982. *Thorunna decussata* is found primarily in association with the pink encrusting sponge *Dendrilla* sp. cf. *D. cactus* (Selenka, 1867), on which we have observed it feeding both in the field and in aquaria. Less commonly, this nudibranch eats the yellow sponge *Aplysilla sulphurea*. Specimens range in length to 20 mm, although they are typically less than 10 mm, and are usually observed clustered on their prey sponges in multiples of 2 to 10 individuals, frequently with eggs. *Thorunna decussata* has been photographed at Kwajalein, D. Johnson.

DESCRIPTION: Mantle bulging conspicuously midlaterally, bright white to pink, usually

with a variable number of irregularly placed, small, diffuse spots of orange. Margin edged with a broken red line and a narrow, white submarginal band. Rhinophore and gills tipped with varying amounts of orange-red.

Combined radular formula of two 8 mm individuals 24–26.16.0.16. Innermost laterals each with a main cusp with three small inner and four larger outer denticles. Outermost laterals long and thin, each with two small denticles on the tip (Figure 13).

DEVELOPMENT: Ova from several egg masses varied in color from cream to bright yellow, and measured 95–105 μm individually within capsules 125–140 μm in diameter. Approximately 130 ova per mm^2 and 8800 in the entire coil. Free-swimming veligers with transparent type-one shells.

DISTRIBUTION: New Caledonia (Risbec 1928).

REMARKS: Our specimens are readily recognized by the distinctive midlateral bulges, and are certainly conspecific with those described by Risbec (1928) from New Caledonia. They are similar to those Kay and Young (1969) identified from Hawaii as *Hypselodoris peasei* (Bergh, 1880), a species originally described by Pease (1860) as *Doris picta* (preoccupied) from the Hawaiian Islands. However, none of the more than 300 specimens examined during this study matches Pease's (1860) color description of *D. picta* or approaches it in size.

Chromodoris simplex Pease, 1871, described from the Society Islands, may be an earlier name for *Thorunna decussata*. Pease's description of a three-fourths inch (19 mm) animal, pale pinkish, white toward the margin, edged with a broken red line, and with one dorsal red spot and red-tipped rhinophores and gills, falls well within the range of color variation of our specimens. Pease (1871) did not mention the midlateral bulges, however, and until specimens can be collected from the type locality for comparison, we retain the name *T. decussata*.

The animal figured by Abe (1964) as *Noumea decussata* does not appear to be conspecific with our animals.

Thorunna norba (Marcus and Marcus, 1970)

SYNONYM: *Noumea norba* Marcus and Marcus, 1970.

REFERENCE: Marcus and Marcus (1970).

MATERIAL: About 15 specimens ranging to 12 × 3 mm in size observed at Enewetak, usually beneath dead coral on shallow lagoon reefs and pinnacles.

DESCRIPTION: Mantle elongate oval, rounded in front and back; thin, somewhat flaring but not especially wide, and colored by a wide, faint yellow band; dorsum orange-brown, approaching peach in color, with two patches of faint yellow to white, one roughly teardrop shaped around the gills with the wider end posteriorly, and the other a band extending from between the rhinophores to the middle of the dorsum. In one specimen, these two faint yellow patches were connected by a thin line of the same color. Between orange-brown dorsum and yellowish margin a submarginal row of alternating diffuse purple and white patches, becoming a narrow, submarginal, purple band around the anterior and posterior ends. Foot pink. Rhinophores with a translucent orange peduncle and about 14 orange lamellae. Branchiae pale orange with five simply pinnate stalks.

Radular formula of an 8 mm specimen 31 × 14.0.14. Innermost lateral teeth each with five denticles on either side of a main cusp, as opposed to the six inner and seven to eight outer denticles noted in the original description. The posterior surface of the innermost laterals between the main cusp and the outer denticles deeply grooved.

DEVELOPMENT: An egg mass deposited by a 10 mm individual consisted of three close-set whorls attached by one edge to the substrate. Ova cream-white measuring approximately 95 μm individually within capsules 110 μm in diameter. About 300 ova per mm^2 and 7500 in the mass.

REMARKS: Marcus and Marcus (1970) summarized the differences in the innermost lateral teeth of the known species of *Noumea*, placing importance on the number of denticles on either side of the main cusp. While the den-

ticulation in our specimens is not exactly the same as that of Marcus and Marcus's *N. norba*, the difference of a few denticles may reflect regional variation and is alone insufficient to warrant a new species designation.

Our record of this species is apparently the first since its original description from a single preserved specimen collected in Fiji.

Cadlinella ornatissima (Risbec, 1928)

REFERENCE: Baba (1949: pl. 22, fig. 79).

MATERIAL: More than 100 specimens, ranging to 25 × 8 mm in size, observed on Enewetak lagoon patch reefs and pinnacles, usually beneath dead coral in 3–20 m of water. These nudibranchs feed on the sponge *Halisarca metabola* deLaubenfels, 1954, and on a thin, encrusting, light brown sponge species. Also collected at Bikini. Specimens photographed at Kwajalein, D. Johnson.

DEVELOPMENT: Egg masses of this species contain discrete extra capsular yolk bodies of 15–30 μm diameter scattered among the ova. Details of ova and development are discussed by Boucher (in press).

DISTRIBUTION: New Caledonia (Risbec 1928), Japan (Baba 1949).

FAMILY DENDRODORIDAE

Dendrodoris coronata Kay and Young, 1969

REFERENCE: Kay and Young (1969).

MATERIAL: At least 25 specimens observed at Enewetak, Rongelap, and Kwajalein, mostly beneath dead coral on lagoon reefs at depths of 1–10 m. One individual measured 40 × 26 mm, others ranged to 20 × 14 mm.

DESCRIPTION: Background color of the Marshall Islands' specimens translucent white to pale orange, with varying amounts of dorsal black and white pigmentation.

DEVELOPMENT: A 12 mm individual deposited an egg mass 13 mm in diameter on 17 August 1981. Ova yellow, 50–60 μm individually with capsules 75–80 μm in diameter. Approximately 165 ova per mm^2 and 39,600 in the ribbon. Over a period of 10 days the 40 mm specimen was observed to deposit eight egg masses containing a total of approximately 750,000 ova. Free-swimming veligers with type-one shells begin to hatch in 6 days.

DISTRIBUTION: Hawaii (Kay and Young 1969).

Dendrodoris elongata Baba, 1936

REFERENCE: Baba (1949: pl. 28, fig. 104)

MATERIAL: About 30 individuals observed at Enewetak, Bikini, and Kwajalein. They range in length to 75 mm and are usually found beneath dead coral on lagoon reefs at depths of 0–10 m.

DESCRIPTION: The Marshall Islands' specimens possess the extremely elongate shape and slightly pustulose dorsum Baba (1936) described as characteristic of *Dendrodoris elongata*. Baba (1936) also listed the "peculiar coloration" as one of the distinguishing features of this species, although his description was based on a single individual. Coloration of Marshall Island specimens variable, from translucent white to brown with numerous diffuse, dark brown spots that consist of aggregations of tiny brown flecks scattered less densely over the entire dorsum; scattered, white, star-shaped spots less evident on some specimens; low dorsal pustules tipped with white or dark gray. Foot and underside of the mantle white with scattered brown spots.

DEVELOPMENT: An egg mass deposited by a 45 mm individual on 17 December 1981 consisted of a wide, cream-yellow ribbon in six loose whorls, slightly crenulate on the free edge. Ova measure 160–170 μm individually within capsules 240 μm in diameter. There were 28 ova per mm^2 and about 35,000 in the egg mass.

DISTRIBUTION: Japan (Baba 1936), New Caledonia (Risbec 1953), Vietnam (Risbec 1956), and Hawaii (pers. obs.).

REMARKS: Considering the color variation in other dendrodorids, such as *Dendrodoris nigra* (see Edmunds 1971), *D. rubra* (see Col-

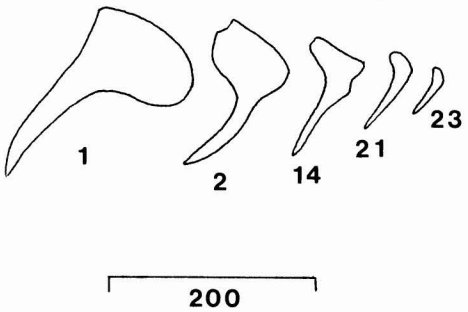

FIGURE 14. *Gymnodoris ceylonica* (Kelaart). Right-half row of radular teeth (scale bar in μm).

lingwood 1881), and *D. tuberculosa* (see Bertsch and Johnson 1981), it is not surprising that *D. elongata* should show the variation in color that we have observed.

Dendrodoris nigra (Stimpson, 1855)

REFERENCE: Edmunds (1971); Bertsch and Johnson (1981: 72).

MATERIAL: Over 50 specimens found at Enewetak, Bikini, Ujelang, and Kwajalein, usually beneath dead coral rocks on intertidal and shallow subtidal lagoon reefs to depths of 3 m.

DEVELOPMENT: A 16 mm individual deposited an egg mass on 16 August 1981. Ova light yellow, measuring 60–70 μm individually within capsules 70–85 μm in diameter. Approximately 360 ova per mm^2 and 7000 in the ribbon. Free-swimming veliger larvae begin to hatch in 4 days. Apex of larval shell dark brown and the rest translucent tan.

DISTRIBUTION: Indo-west Pacific (Edmunds 1971).

Dendrodoris tuberculosa (Quoy and Gaimard, 1832)

SYNONYMY: *Doris carbunculosa* Kelaart, 1858. *D. rugosa* Pease, 1860.

REFERENCE: Kay and Young (1969); Bertsch and Johnson (1981: 73).

MATERIAL: Four specimens, the largest 180 × 140 mm, found at Kwajalein, under dead coral on the intertidal reef at low tide, in June and September 1982.

DISTRIBUTION: Indo-west Pacific, including Zanzibar (Eliot 1905*b*), Mauritius (Bergh 1889), Sri Lanka (Kelaart 1858*a*), India (Alder and Hancock 1864). Vietnam (Risbec 1956), Indonesia (Bergh 1905), Japan (Baba 1936, 1937*a*, 1949), and Hawaii (Pease 1860; Kay and Young 1969).

FAMILY POLYCERIDAE

Gymnodoris ceylonica (Kelaart, 1858*b*)

Figure 14

SYNONYMY: see MacNae (1958).

REFERENCE: Risbec (1928: pl. 7, fig. 11).

MATERIAL: On 20 September 1981, seven specimens were observed crawling up a sandy lagoon slope or drifting in a strong tidal current in 6–15 m of water near Medren Island, Enewetak. Three days later we observed more than 80 specimens, ranging to 80 mm in length, on lagoon sand flats near Enewetak Island. These nudibranchs were actively crawling obliquely shoreward (northeast) in a loose column at a depth of 25 m. Within one week, the gymnodorids had completely disappeared from the collection site. This migration may have been related to reproduction, as all the specimens observed were ripe. Eliot (1904*c*) noted that *Gymnodoris crocea* (Bergh, 1889) "flocks to shallow water for the deposition of spawn." On 28 February 1982, possibly following another shoreward migration, numerous individuals of *G. ceylonica* were observed in 5–6 m of water on the lagoonside of Medren, mostly depositing egg masses on and under dead coral rocks. These opisthobranchs prey on *Stylocheilus longicaudus*.

DESCRIPTION: Radular formula of a 40 mm individual 19 × 23.0.23. Large innermost lateral tooth with a large, clublike base. Teeth smaller laterally, the outermost as narrow, pointed spikes (Figure 14). Although the external morphology of this species is quite distinctive, tooth shape is variable, especially in the shape of the base, among specimens from

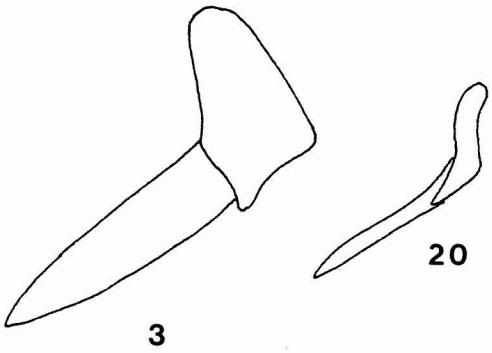

FIGURE 15. *Gymnodoris citrina* (Bergh). Two teeth from the right-half row.

different regions (see figures in Eliot 1904*c*, Bergh 1905, Risbec 1928, and MacNae 1958).

DEVELOPMENT: Specimens collected on both 20 and 23 September 1981 deposited egg masses in aquaria. Ova arranged in clusters of 20–40 in a double spiral within a gelatinous string, the clusters 0.5–0.6 mm in greatest diameter. Ova yellow-orange, measuring approximately 107 μm individually within capsules 170 μm in diameter.

DISTRIBUTION: Sri Lanka (Kelaart 1858*b*), Zanzibar (Eliot 1904*c*), South Africa (MacNae 1958), Indonesia (Bergh 1905), New Caledonia (Risbec 1928), Australia (Burn 1975), the Society Islands (Pease 1871), and Guam (Carlson and Hoff 1981).

Gymnodoris citrina (Bergh, 1877)

Figure 15

REFERENCE: Young (1967); Baba (1949: pl. 11, fig. 37, 38).

MATERIAL: More than 150 specimens, ranging in length to 30 mm, found on lagoon reefs and pinnacles at Enewetak, Bikini, and Kwajalein, beneath dead coral rocks at depths of 2–15 m. Specimens have been observed in the field and in aquaria feeding on other gymnodorids, including conspecifics, with which they copulate while, at the same time, consuming them as prey. These opisthobranchs also eat the egg masses of other species of gymnodorid.

DESCRIPTION: Our specimens differed from those of Young (1967) only in that the radular teeth are slightly straighter, with more distinctive bases. The base of a midlateral tooth forms a basal cusp, present in varying degrees on all but the innermost tooth (Figure 15).

DEVELOPMENT: An egg mass deposited on 31 January 1982 by a 17 mm individual consisted of three whorls attached by one edge to the substrate. Ova yellow, measuring approximately 175 μm individually within capsules 215 μm in diameter. About 50 ova per mm^2 and 6500 in the mass.

DISTRIBUTION: Palau (Bergh 1877), Japan (Baba 1930, as *Gymnodoris japonica*; 1949), Tahiti (Marcus and Marcus 1970), Australia (Burn 1975), Samoa (Eliot 1900), Enewetak (Marcus and Burch 1965, as *G. bicolor*; Young 1967), the Solomon Islands (Miller 1969), and Guam (Carlson and Hoff 1981).

Gymnodoris okinawae Baba, 1936

Figure 16

REFERENCE: Kay and Young (1969); Bertsch and Johnson (1981: 79).

MATERIAL: Twelve specimens, ranging to 25 × 3 mm from Enewetak, usually beneath dead coral rocks on lagoon reefs and pinnacles at depths of 4–10 m. Three additional individuals collected at Kwajalein, K. DeGroff and D. Johnson. Unlike the Hawaiian specimens of *Gymnodoris okinawae*, which eat elysiid sacoglossans (Kay and Young 1969), our specimens prey on small cephalaspideans. Several species of *Elysia* offered to *G. okinawae* in aquaria were not accepted.

DESCRIPTION: The Marshall Islands' specimens differ from previous records in some aspects of coloration and radular morphology. Body translucent, cream colored, scattered with low, white pustules, between which are rather dense, irregular rows of bright orange-red spots, forming a network around the pustules. Radular teeth of a 20 mm Enewetak individual smaller than those of larger specimens reported by Kay and Young (1969). Innermost laterals are proportionately larger

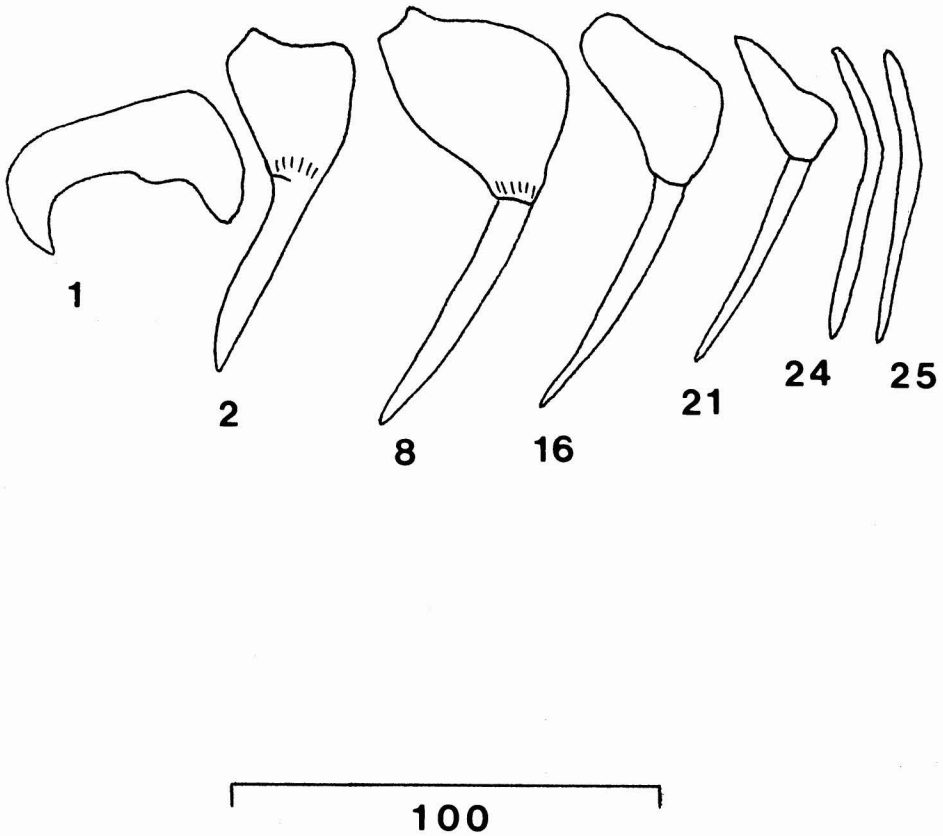

FIGURE 16. *Gymnodoris okinawae* Baba. Right-half row of radular teeth (scale bar in μm).

than the outer teeth, which do not increase in size to the outermost laterals; instead, the teeth are largest near the innermost, then become slightly smaller outward (Figure 16).

DISTRIBUTION: Japan (Baba 1936), Hawaii (Kay and Young 1969).

REMARKS: The slight differences in coloration, radular morphology, and diet are probably insufficient to consider the Marshall Islands' specimens separate from *Gymnodoris okinawae*.

Gymnodoris plebeia (Bergh, 1877)

REFERENCE: Kay and Young (1969).

MATERIAL: At least 40 specimens observed at Enewetak and Kwajalein, usually beneath dead coral on lagoon reefs at depths of 3–5 m. The largest measured 16 × 3 mm, but most do not exceed 10 mm in length.

DISTRIBUTION: Pacific (Bergh 1877), Hawaii (Kay and Young 1969).

Gymnodoris striata (Eliot, 1908)

Figure 17

SYNONYMY: *Trevelyana striata* Eliot, 1908. *Analogium striatum* (Eliot) Risbec, 1928.

REFERENCE: Risbec (1928); Johnson (1982: 93, as *Analogium striatum*).

MATERIAL: More than 50 specimens, ranging in size to 55 × 22 mm, observed at Enewetak, usually in sandy areas of lagoon reefs

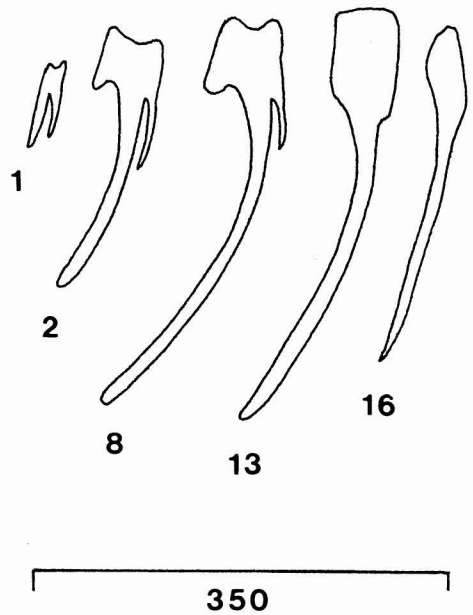

FIGURE 17. *Gymnodoris striata* (Eliot). Right-half row of radular teeth (scale bar in μm).

and pinnacles at depths of 3–25 m. *Gymnodoris striata* preys voraciously upon *Plakobranchus ocellatus*, both in the field and in aquaria.

DESCRIPTION: External descriptions provided by different authors vary. In our specimens the body is high sided, soft in texture, widest at midbody, rounded anteriorly, and tapers to a blunt point posteriorly. Mantle margin distinct, narrow, and thin. Background color translucent white, densely speckled with opaque white; foot and mantle margins bright orange. Middorsal, elevated ridge originating behind the rhinophores and extending posteriorly to the gills bright orange; shorter ridges on one or both sides of the middorsal ridge. Posterior to the gills one or more broader ridges of orange extend about one-third of the way to the tail. Tail with an angular middorsal keel, edged with orange. An additional ridge of orange along each side of the foot; bottom of foot white. Rhinophores close set, with transparent peduncles and orange clubs, each bearing about 15 lamellae. Branchiae distinctive, near midbody, and comprised of a transverse series of five to nine parallel plates with longitudinally arranged lamellar pinnae; plates and pinnae edged with orange.

Radular formula of a 50 mm specimen 16 × 19.0.19. Innermost laterals small and bicuspid; remaining teeth elongate and smooth, the inner two-thirds with sharp, outer, basal cusps (Figure 17).

DEVELOPMENT: An egg mass deposited by a 40 mm individual on 10 December 1981 consisted of three loose, cylindrical whorls, lightly attached to the substrate. Ova bright yellow, measuring approximately 240 μm, individually encased in capsules 250 μm in diameter. About 14 ova per mm^2 and 2900 in the coil.

DISTRIBUTION: Red Sea (Eliot 1908), New Caledonia (Risbec 1928), Japan (Baba 1937*b*), Fiji (Marcus and Marcus 1970), and Australia (Burn 1975).

REMARKS: Risbec (1928) erected *Analogium* for species with the peculiar branchial arrangement of *Gymnodoris striata*. MacNae (1958) questioned the need for this genus, stating that the gills of one of his specimens of *G. bicolor* also "appear to be arranged in a transverse row in the preserved specimen," a statement which suggests that he misunderstood Risbec's (1928) description of peculiar lamellate plates in living specimens. The distinctive bicuspid inner teeth and unique arrangement of the gills may warrant the separate generic designation, but we retain *Gymnodoris* until we complete studies of several other, apparently undescribed species from Enewetak with similar gill structure.

Nembrotha kubaryana Bergh, 1877

REFERENCE: Bergh (1877).

MATERIAL: Specimens range to 60 mm in length at Kwajalein and are most often in ledges and small caves on lagoon pinnacles and on the steep, seaward slope at depths of 8–20 m.

DESCRIPTION: Body soft, slender, elongate, rounded anteriorly, highest and widest at midbody, tapering to a blunt point posteriorly. Background color black; dorsum and sides with large, scattered, irregular, green spots, some of which combine forming a short margin around the cephalic hood; foot margins and rhinophore sheaths brilliant red. Rhino-

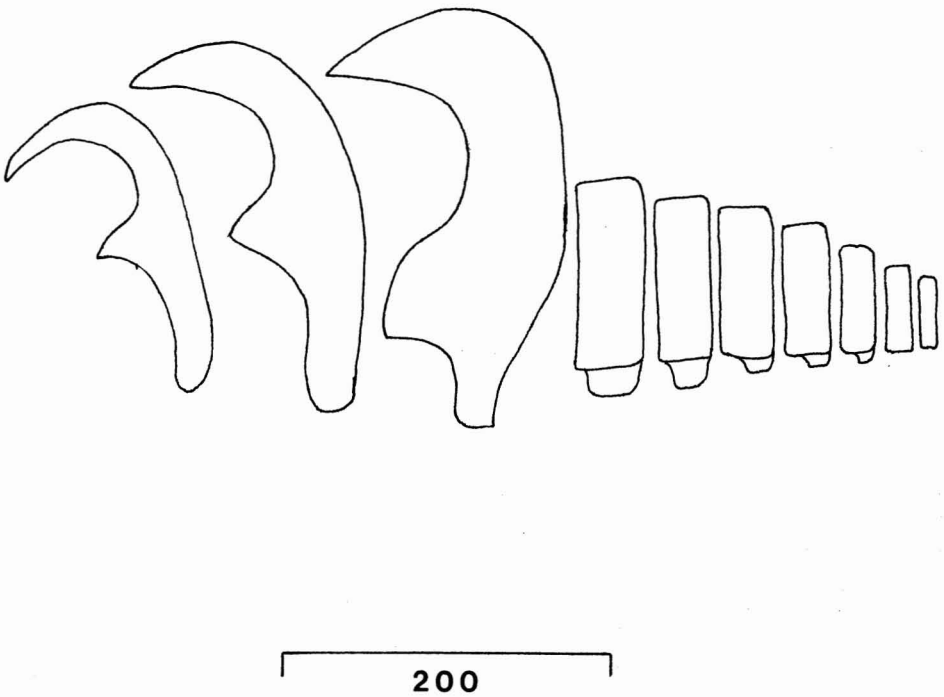

FIGURE 18. *Plocamopherus ceylonicus* (Kelaart). Entire right-half row of radular teeth (scale bar in μm).

phores rodlike, black, with 15–20 bright red lamellae. Branchiae located at midbody, of five black, bipinnate stalks, edged with brilliant red.

REMARKS: Our specimens match the original description by Bergh (1877) from Palau, Bergh's (1905) color illustration of *Nembrotha kubaryana* from Indonesia shows an animal more longitudinally lined with green rather than spotted.

Plocamopherus ceylonicus (Kelaart, 1858*a*)

Figure 18

REFERENCE: Thompson (1975); Risbec (1928: pl. 4, fig. 6).

MATERIAL: Six specimens, ranging in size to 23 × 5 mm, at Enewetak, all on the lagoonside of Enewetak Island, beneath dead coral, at depths of 2–5 m in September and December 1981.

DESCRIPTION: Radular formula of a 14 mm individual 12 × 7.3.0.3.7. The three innermost laterals overlapping hooks, each with a large denticle. Remaining teeth flat plates, some with posterior keels (Figure 18).

DISTRIBUTION: Sri Lanka (Kelaart 1858*a*, as *Polycera ceylonica*), eastern Australia (Thompson 1975), and New Caledonia (Risbec 1928).

REMARKS: Like *Plocamopherus tilesii* Bergh, 1877, the body has several patches that phosphoresce when the animal is disturbed. These animals are capable of swimming by laterally bending the body and using a flattened, posterior keel as a fin.

FAMILY AEGIRETIDAE

Aegires villosus Farran, 1905

REFERENCE: Edmunds (1971); Baba (1955: pl. 4, fig. 13).

MATERIAL: One specimen, 9 × 1 mm, Enewetak, lagoonside Jinimi Island, under dead coral, 5 m, 24 August 1982.

DISTRIBUTION: Sri Lanka (Farran 1905), East Africa (Edmunds 1971), New Caledonia (Risbec 1928), and Japan (Baba 1955).

FAMILY GONIODORIDIDAE

Goniodoris joubini Risbec, 1928

REFERENCE: Risbec (1928: pl. 5, fig. 2).

MATERIAL: More than 50 specimens, ranging in length to 17 mm, observed beneath dead coral on shallow, inshore reefs of Enewetak, Kwajalein, and Bikini.

DESCRIPTION: Body coloration rather variable: specimens are typically cream-white, irregularly spotted with dark purplish-black, white, and yellow; darker spotting varying in density, nearly obscuring the cream background in some individuals.

DEVELOPMENT: An egg mass deposited by a 10 mm specimen possessed white ova measuring 120–150 μm individually within capsules 180–210 μm in diameter. About 30 ova per mm^2 and 350 in the entire mass. Free-swimming veliger larvae with transparent type-one shells begin hatching in 6 days.

DISTRIBUTION: New Caledonia (Risbec 1928), Hawaii (Kay and Young 1969, as *Goniodoris* sp. cf. *joubini*; pers. obs.).

Goniodoridiella savignyi Pruvot-Fol, 1933

REFERENCE: Baba (1960).

MATERIAL: Two specimens, 4 × 1 mm, Enewetak, lagoonside Enewetak Island, under dead coral, 3–5 m, 19 September and 22 November 1981.

DISTRIBUTION: Gulf of Suez (Pruvot-Fol 1933); Japan (Baba 1960).

FAMILY PHYLLIDIIDAE

Phyllidia pustulosa Cuvier, 1804

REFERENCE: Baba and Hamatani (1975); Bertsch and Johnson (1981: 76).

MATERIAL: More than 150 specimens, ranging in size to 30 × 9 mm, observed. These nudibranchs crawl about in the open during the day. At Kwajalein, Enewetak, and Bikini they are found on lagoon pinnacles and the seaward slopes at depths of 5–20 m, and occasionally along interisland lagoon reefs.

DEVELOPMENT: A double spiral egg mass about 10 mm in diameter contained ova measuring 170–200 μm individually within capsules 230–260 μm in diameter. Approximately 33 ova per mm^2 and 1850 in the mass. Free-swimming veliger larvae with transparent brown, type-one shells begin hatching in 5 days.

DISTRIBUTION: Indo-west Pacific (Baba and Hamatani 1975), Hawaii (Bertsch and Johnson 1981).

REMARKS: Individuals of this species produce a grayish-white film of mucus, which has a strong odor and kills other organisms placed in the same closed container. The sponge prey, tentatively identified as a species of *Hymeniacodon*, produces the same odor.

Phyllidia varicosa Lamarck, 1801

REFERENCE: Edmunds (1971); Bertsch and Johnson (1981: 74, 75).

MATERIAL: More than 50 specimens of *Phyllidia varicosa*, ranging in size to 56 × 21 mm, observed at Enewetak and Kwajalein in a variety of habitats. These nudibranchs, like those of *P. pustulosa*, are frequently found exposed on the substratum and secrete a grayish mucus toxic to other organisms (see Johannes 1963).

DISTRIBUTION: Indo-west Pacific (Edmunds 1971).

FAMILY ARMINIDAE

Dermatobranchus fortunata Bergh, 1888

REFERENCE: Bergh (1888).

MATERIAL: Generally, 5–10 specimens ranging in size to 16 × 4 mm, can be found

per search hour at Enewetak and Kwajalein, beneath dead coral on the exposed interisland reef flat at low tide. White egg masses were observed throughout the year.

DESCRIPTION: Body flattened, elongate, widest anteriorly, tapering to a blunt point posteriorly. Dorsum white, faintly pustulose, frequently with faint brown lines scattered between the pustules. Lateral margins with eight irregularly shaped, black blotches, containing small, white pustules. Anterior margin centrally indented, and, except for this indentation, colored bright orange, as is the lateral margin on those sections adjacent to the black blotches. Rhinophore sheaths extend upward from just within the anterior mantle indentation, white at the base, and crowded with vertical, short lines of orange, black, and white distally. Rhinophores narrow, orange with white tips. Radula as figured by Bergh (1888).

DISTRIBUTION: Indonesia (Bergh 1888).

FAMILY TRITONIIDAE

Bornella adamsii Gray, 1850

SYNONYM: see Bertsch (1980).

REFERENCE: Bertsch and Johnson (1981: 85).

MATERIAL: Over 25 specimens, ranging in size to 50 × 4 mm, observed at Enewetak and Kwajalein. During the day they are found beneath rocks on shallow lagoon reefs, and nocturnally in ledges on the steep slopes of lagoon pinnacles and the seaward reef. Several individuals were observed feeding on hydroids of the genus *Sertularia*.

DESCRIPTION: The external characteristics of *Bornella adamsii* have been described frequently (usually as *B. digitata* Adams and Reeve, 1850). Marshall Islands' specimens vary from uniform orange-brown to pale cream with a network of orange and orange-brown subapical rings on the dorso-lateral processes.

DISTRIBUTION: Indo-west Pacific

Marianina rosea (Pruvot-Fol, 1930)

REFERENCE: Carlson and Hoff (1973, as *Aranucus bifidus* Odhner, 1936).

MATERIAL: More than 150 specimens found beneath dead coral rocks on shallow lagoon reefs at depths of 1–5 m, at Enewetak, Kwajalein, Bikini, and Ujelang.

DISTRIBUTION: New Caledonia, Australia (Burn 1974), Gilbert Islands (Odhner 1936), and Guam (Carlson and Hoff 1973).

AEOLIDIACEA[4]

Flabellina alisonae Gosliner, 1980

REFERENCE: Gosliner (1980); Bertsch and Johnson (1981: 88).

MATERIAL: More than 60 specimens observed at Enewetak, Kwajalein, Bikini, and Ujelang. They and their egg masses are usually found beneath dead coral rocks on exposed reef flats at low tide. Rarely, specimens are found subtidally on lagoon reefs and pinnacles.

DESCRIPTION: The lateral teeth of the Marshall Islands' specimens are more triangular in shape than those described by Gosliner (1980). The denticles on the central teeth are more elongate and separated by grooves that extend well into the base of each tooth.

DISTRIBUTION: Okinawa (Baba 1936, as *Coryphella ornata* Risbec, 1928), Japan (Baba 1955, as *Flabellina ornata*), Hawaii and Enewetak (Gosliner 1980).

Favorinus japonicus Baba, 1949

REFERENCE: Kay (1979); Rudman (1980); Bertsch and Johnson (1981: 96, 97).

MATERIAL: Eight specimens, the largest 12 × 2 mm, observed at Enewetak and Kwajalein, all beneath dead coral on lagoon reefs and pinnacles, at depths of 1–8 m. These

[4] Family names are not utilized in this group of nudibranchs because of apparent lack of agreement on the boundaries of the families.

aeolids prey on the eggs of other opisthobranchs, including *Dendrodoris nigra* and *Hallaxa* sp., and tend to pick up the color of their food source (see Kay 1979).

DESCRIPTION: Cerata vary in color from yellow to orange to pink; rhinophores with three annular swellings rather than the two reported for Japanese and Hawaiian specimens (Baba 1949, Gosliner 1980). Radular teeth and jaws as figured by Baba (1949).

DISTRIBUTION: Japan (Baba 1949), Hawaii (Kay 1979, Gosliner 1980), and East Africa (Rudman 1980).

REMARKS: Gosliner (1980) stated that this species is similar to *Favorinus gouaroi* (Risbec, 1928), but differs in the smooth radular teeth; Risbec's species has teeth with lateral denticulation. However, as Rudman (1980) has pointed out, lateral denticles appear to be a variable characteristic in *F. japonicus*, as is the case in two closely related species, *F. branchialis* (Rathke, 1806) and *F. auritulus* Marcus, 1955. Since two of our specimens of *F. japonicus* were light yellow, as described for *F. gouaroi* by Risbec (1928), it seems likely that they are conspecific. A final determination of synonymy should await the comparison of *F. japonicus* with New Caledonian specimens fitting the description of *F. gouaroi*.

Phestilla lugubris (Bergh, 1870)

Figure 19

REFERENCE: Rudman (1981*a*); Bertsch and Johnson (1981: 90, 91, as *P. sibogae*).

MATERIAL: More than 30 specimens of this cryptic species have been found in association with the scleractinean coral *Porites* at Enewetak and Kwajalein. Typically, groups of two or more individuals, frequently with cream-colored egg masses, are found beneath coral heads. At Enewetak, *Phestilla lugubris* is readily eaten by several species of wrasse (Labridae).

DESCRIPTION: Radulae of 17 and 18 mm specimens with 40 and 44 uniseriate teeth, respectively. Teeth of Marshall Islands' specimens basically similar to those of specimens

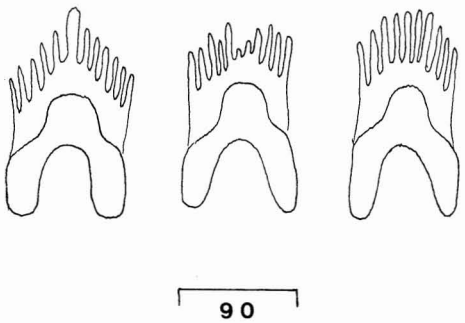

FIGURE 19. *Phestilla lugubris* (Bergh). Selected radular teeth from a single individual (scale bar in μm).

figured by Gosliner (1980), but vary considerably within a single individual (Figure 19). Central cusp variable in size, and may be absent. Lateral denticles vary in height but are uniformly comb shaped, similar to those figured by Rudman (1981*a*).

DISTRIBUTION: Indo-west Pacific from East Africa to Hawaii (Rudman 1981*a*).

Phyllodesmium hyalinum Ehrenberg, 1831

REFERENCE: Rudman (1981*b*); Baba (1937*a*: pl. 2, fig. 5).

MATERIAL: Five specimens, ranging to 20 $\times$ 2.5 mm in size (cerata not included), found on lagoon pinnacles at Enewetak and Kwajalein feeding on the soft coral *Xenia* sp.

DISTRIBUTION: Red Sea (Gohar and Aboul-Ela 1957, as *Phyllodesmium xeniae*), East Africa (Eliot 1905*b*; Rudman 1981*b*), and Japan (Baba 1937*a*).

Pteraeolidia ianthina (Angas, 1864)

SYNONYMY: see Gosliner (1980).

REFERENCE: Kay (1979); Rudman (1982*b*); Bertsch and Johnson (1981: 98, 99).

MATERIAL: Solitary specimens of *Pteraeolidia ianthina* measuring up to 70 mm in length are found infrequently in a variety of habitats at Enewetak and Kwajalein. We have observed them on and under dead coral, on pier pilings,

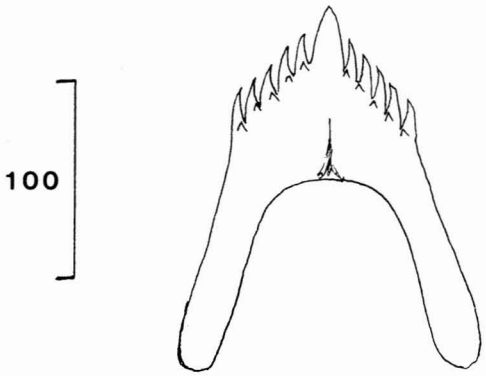

FIGURE 20. *Phidiana bourailli* (Risbec). Radular tooth (scale bar in μm).

and on the hull of a sunken ship at depths of 3–20 m.

DEVELOPMENT: A 70 mm individual deposited an egg mass on 11 December 1981. Ova white, spiraled into two loose whorls, measuring about 140 μm individually within capsules 190 μm in diameter. About 97 ova per mm^2 and approximately 10,000 in the entire mass. Free-swimming veliger larvae begin hatching in 5 days.

DISTRIBUTION: Indo-west Pacific (Kay 1979; Gosliner 1980), including Truk, eastern Caroline Islands, and the northwestern Hawaiian Islands, especially Nihoa and Necker (pers. obs.).

Phidiana bourailli (Risbec, 1928)

Figure 20

REFERENCE: Rudman (1980: fig. 1*B*).

MATERIAL: At least 30 specimens, generally less than 10 mm in length, observed under dead coral at depths of 1–5 m on lagoon reefs of Enewetak and Kwajalein.

DESCRIPTION: Radula of a 9 mm specimen uniseriate with 38 teeth. Number and shape of denticles on the different teeth of a single specimen vary; on either side of a main cusp are five to eight not necessarily symmetrical denticles. Posterior surface of each tooth with a central groove (Figure 20), and minor bumps at the base of each denticle.

DISTRIBUTION: New Caledonia (Risbec 1928), East Africa (Rudman 1980).

Phidiana indica (Bergh, 1896)

REFERENCE: Rudman (1980); Bertsch and Johnson (1981: 95, as *Caloria militaris*).

MATERIAL: About 20 specimens, ranging to 20 mm in length, observed at Enewetak and Kwajalein, usually beneath dead coral, on pier pilings, or on buoy lines at depths of 3–40 m.

DISTRIBUTION: Indo-west Pacific (Baba 1969; Gosliner 1980; Rudman 1980).

REMARKS: It is obvious from the literature that there is no clear consensus on the status of various genera within the Glaucidae or Facellinidae (see Edmunds 1969, Burn and Narayanan 1970, Miller 1974, Gosliner 1980, Rudman 1980). We follow Rudman (1980) in retaining *Phidiana* for this species.

Glaucus atlanticus Forster, 1777

REFERENCE: Thompson and McFarlane (1967); Bertsch and Johnson (1981: 100).

MATERIAL: Occasional specimens of *Glaucus atlanticus* are washed ashore on windward beaches of Enewetak. Specimens have also been found at Kwajalein by D. Johnson.

DISTRIBUTION: Circumtropical (Thompson and McFarlane 1967).

Spurilla major (Eliot, 1903*b*)

REFERENCE: Kay (1979, as *Berghia major*); Rudman (1982*b*); Bertsch and Johnson (1981: 89, as *Berghia major*).

MATERIAL: One specimen, 23 × 7 mm, Enewetak, Bokandretok-Medren reef, under dead coral, 8 m, 14 July 1981.

DISTRIBUTION: Indo-west Pacific, including East Africa (Eliot 1903*b*) and Hawaii (Kay 1979, Gosliner 1980).

REMARKS: Rudman (1982*b*) believes the characteristics of the genus *Berghia* Trinchese, 1877 are adequately covered by the definition of *Spurilla* Bergh, 1864.

DISCUSSION

After examining large numbers of living opisthobranchs during this study and previous studies in Hawaii (Johnson and Bertsch 1979; Bertsch and Johnson 1979*a*, 1979*b*, 1981, 1982; Johnson 1983), we conclude that external morphology and coloration are generally reliable species characteristics. While there is some intraspecific variation, the identity of a specimen is seldom in question once familiarity with the species has been established. Many species are similar in coloration or other characteristics, but a glance at living specimens will usually readily differentiate among them (see Rudman 1982*a*).

It should be noted that intraspecific variation is also observed in radular characteristics, both within and between geographic locations. In many cases, conspecifics collected from Hawaii and Enewetak exhibit differences in details of radular morphology. Even within a single individual (e.g., *Phestilla lugubris*), tooth shape varies in teeth from different rows. Obviously, descriptions based solely on radular morphology are insufficient, particularly in genera within which the radulae of different species are similar, as they are, for example, in the genus *Chromodoris*.

A further problem is the oversynonymization of species, which can create problems in the determination of geographic distributions. For example, acceptance of Eliot's (1904*b*) statement that *Chromodoris tryoni* and *C. aureopurpurea* are conspecific would indicate that *C. tryoni* is distributed from East Africa to the Society Islands, instead of occurring only in the Pacific, as we presently believe. Another example is Bergh's (1905) apparent synonymization of *C. quadricolor* and *C. elisabethina*, which would make the former a widespread Indo-west Pacific species rather than restricting it to East Africa and the Red Sea as Rudman (1977) has done.

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